

**REPORT TO THE ALASKA BOARD OF FISHERIES**  
**KUSKOKWIM AREA, 1997**

By:

Charles Burkey Jr.  
Thomas Cappiello  
Jim Menard  
Douglas B. Molyneaux

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## **AUTHORS**

Charles Burkey Jr. is the Kuskokwim Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, P.O. Box 1467, Bethel, AK 99559

Thomas Cappiello is an Assistant Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, P.O. Box 1467, Bethel, AK 99559

Jim Menard is an Assistant Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, P.O. Box 1467, Bethel, AK 99559

Douglas B. Molyneaux is the Kuskokwim Area Research Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, 333 Raspberry Road, Anchorage, AK 99518-1599

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## INTRODUCTION

The Kuskokwim Area includes the Kuskokwim River drainage and all waters of Alaska that flow into the Bering Sea between Cape Newenham and the Naskonat Peninsula (Figure 1). Commercial salmon fishing takes place in four districts. District 1, Lower Kuskokwim River, is the portion of the Kuskokwim River upstream of Popokamiut to the regulatory markers located at Bogus Creek about nine miles above the mouth of the Tuluksak River (Figure 2). District 2, Middle Kuskokwim River, extends from regulatory markers approximately eight miles below Lower Kalskag upstream to the regulatory markers at Chuathbaluk (Figure 3). District 4, Quinhagak, is in Kuskokwim Bay between the mouth of Weelung Creek and the southern mouth of the Arolik River (Figure 4). District 5, Goodnews Bay, is the waters inside of Goodnews Bay (Figure 5).

Six species of Pacific salmon occur in the Kuskokwim Area, with chum and coho salmon being the most abundant. Chinook, sockeye and chum salmon begin entering streams in late May and early June. Since 1984, the mid-point of the chinook run at Bethel has averaged 23 June. The mid-point for sockeye and chum averages, 27 June and 3 July, respectively. Coho salmon begin entering area streams in mid July with entry continuing into September. Pink salmon occur throughout the Kuskokwim Area, however, there has been little data collected on this species because of the lack of commercial markets and low subsistence use. Pink salmon demonstrate even-year dominance in the Kuskokwim Area. Resident Rainbow trout occur in some tributaries of the Kuskokwim River and Bay, and are harvested by subsistence and sport fishermen.

### *Subsistence Fishery*

The Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, manages the subsistence and commercial fisheries in the Kuskokwim Area. The department's goal is to manage both fisheries on a sustained yield basis within the policies set forth by the Alaska Board of Fisheries (Board). Subsistence fishers have priority use of the salmon resource by Alaska Statute (AS 16.05.258). In the Kuskokwim Area, subsistence fishing is a vital part of the local culture and economy, with over 1,300 families participating (Burkey et al. 1997). The 9 year average subsistence harvest of all salmon in the Kuskokwim Area is 273,893 (Table 1).

The subsistence fishery is subject to few restrictions, however some restrictions are imposed to deter illegal commercial fishing. Short closures before, during, and following commercial periods discourage illegal commercial fishing during the open subsistence fishing periods. In District 1 this subsistence closure includes the commercial fishing district, Kuskokuak Slough, and the Kuskokwim River between Districts 1 and 2, but not the tributary streams. In Districts 2, 4, and 5 the subsistence closures apply to the commercial districts and spawning tributaries. In all districts there is more time allowed for subsistence fishing than commercial fishing.



The Subsistence Division conducts subsistence salmon harvest surveys during October and November. This timing provides more complete catch data, particularly for coho salmon. The 1997 catch statistics will be available in March 1998.

### ***Commercial Fishery***

There are 832 limited entry permits issued for the Kuskokwim Area. Permit holders can transfer freely between Kuskokwim Area districts. Commercial fishing regulations set maximum gillnet specifications of 6-inch or smaller mesh, 50 fathoms in length and 45 meshes in depth for all districts. Fishing periods in Districts 1 and 2 are usually 6 hours in duration from 1:00 p.m. until 7:00 p.m., as required by 5 AAC 07.365 KUSKOKWIM RIVER SALMON MANAGEMENT PLAN. In the last decade, commercial fishing periods during July and August have been concurrent in Districts 1 and 2 when buyers are present in both districts. Fishing periods in Districts 4 and 5 are usually concurrent and 12 hours in duration from 9:00 a.m. until 9:00 p.m.

#### **Districts 1 and 2**

Commercial salmon fisheries in the Kuskokwim River are managed through a cooperative process involving the Kuskokwim River Salmon Management Working Group (Working Group). Formed in 1988, the Working Group is comprised of representatives of commercial, subsistence, sport, and industry user groups from throughout Kuskokwim River drainage. Through uncommon dedication by all the concerned parties, the Working Group provides inseason management recommendations that serve as a cooperative approach to management.

A conservation concern for Kuskokwim River chinook salmon arose following a series of years with poor chinook salmon escapements in the mid 1980's (Figure 6). This conservation concern was compounded by the low number of female chinook salmon in the escapement, as indexed by the Kogrukluk River weir (Table 2). Beginning in 1984, the Board began restricting the commercial fishery because the department was unable to correct the problem through inseason management measures. In 1985, a shift to 6-inch or smaller commercial gillnets reduced the harvest of larger female chinook salmon. This gear change was successful in reducing the female composition of the commercial catch from 43% to 29%. However, the total escapement index continued to decline (Figure 6). Following the 1986 season, the directed commercial harvest of chinook salmon was prohibited to provide for subsistence needs and to maintain average spawning escapements. Chinook salmon escapements improved in subsequent years (Figure 6) as did the incidental commercial harvest of chinook salmon (Table 3). The subsistence fishery continues to target large chinook salmon with "king" gear. Elimination of the directed high seas salmon fishery likely played a role in the improved escapements and status of chinook salmon.

The sockeye salmon catch is incidental to the chum salmon fishery in Districts 1 and 2. Before 1981, sockeye and chum salmon were not accurately differentiated in commercial or subsistence catches. This prevented an accurate record of the sockeye and chum salmon harvest in the Kuskokwim River. Sockeye salmon comprised 5% to 33% of the sockeye-chum salmon catch since 1981. Before 1981, the reported sockeye catch was less than 2% of the combined sockeye-chum catch (Table 4).

Before 1971, chum salmon were an incidental catch during the chinook and coho directed fisheries. The expansion of the commercial chum fishery began in 1971. Based on 1924-1943 subsistence harvest estimates, a total chum salmon harvest of 400,000 appeared to be consistent with the reproductive potential of the run. A combined commercial and subsistence catch of 400,000 chum salmon was the management goal from 1971 to 1979. The commercial chum salmon harvest for the Kuskokwim River (Districts 1 and 2) has averaged 507,147 salmon in the last ten years (Table 5).

Subsistence chum harvests in the Kuskokwim River have declined since the inception of the commercial fishery in 1971 (Table 5). From 1971 to 1980 the average subsistence harvest was 173,689. The average harvest decreased to 136,206 for the period 1981 to 1990, and further decreased to 79,710 for the period 1990 to 1996. This is thought to be due to the decline in the use of dog teams for transportation, not the increased commercial harvest.

The following guidelines are used to manage the commercial harvest of chum salmon:

1. run assessment projects indicate that escapements will be adequate.
2. Commercial catch per unit effort compares to previous years when escapement was adequate.
3. Subsistence fishers report adequate subsistence catches.

Declining run strength normally results in a 1 to 2 week closure beginning in the last half of July. Before 1985, only that portion of District 1 downstream of Bethel was open to commercial fishing during the chum salmon fishery. The Board instructed the department to use the entire length of District 1 beginning in 1985. This increased the efficiency of the fleet and resulted in low chum escapements in 1986 and 1987. Runs in 1988 and 1989 were at record high levels, but to reach escapement objectives more time was required between fishing periods. The 1990 and 1991 runs were smaller but a 4 to 6 day spacing between periods resulted in approaching or reaching chum salmon escapement objectives.

Traditionally, coho salmon (locally called "rain fish") were not well utilized because of poor drying conditions during rainy fall weather. Subsistence use of coho salmon has increased in areas where freezers are available to preserve fish. In recent years, Subsistence Division staff have started their surveys after coho salmon have completed migration to the upper river villages. This has probably increased numbers of coho salmon reported because subsistence users

have completed their coho salmon catches by the time the survey data is collected in October and November.

Commercial fishery management in the Kuskokwim River is based on coho salmon abundance when that species predominates in the commercial catch. Run strength is assessed by evaluating catches in the test fishery, CPUE of the commercial fleet, and escapement trends at Kogrukluk River weir. Fishing periods are usually simultaneous in Districts 1 and 2 throughout the season which closes by regulation on 1 September. Record runs in 1984 and 1994 as well as a late run in 1989 resulted in extensions of the season into September. The management strategy is similar to that for chum salmon.

In the most recent 20 years of fishing for this species, catches have ranged from the 1983 catch of 196,287 coho salmon to the record harvest in 1996 of 937,299 fish (Table 4). The most recent ten year average harvest is 572,524 fish. Since 1985, in years when both districts have had buyers, the number of permit holders participating has ranged from 650 to 775.

Since inception of the Working Group, the coho salmon escapement goal at the Kogrukluk River weir has been achieved in three out of the six years with adequate data. Distrust by the public of the Bethel test fishery, lag time of Kogrukluk River weir escapements, and lack of sufficient additional data contributed to the over fishing. The department's uncertainty during the early portions of the run often caused corrective actions to come too late to make a significant difference in escapement needs to the upper drainage as indexed by Kogrukluk River weir.

#### **District 4**

District 4 is located in the marine waters near the village of Quinhagak at the mouth of the Kanektok River, approximately 25 miles south of the Kuskokwim River (Figure 4). Commercial fishing occurs only in the marine waters of Kuskokwim Bay to ensure adequate escapement of salmon into the Kanektok and Arolik Rivers. The northern boundary of the fishing district is approximately seven miles from Quinhagak at Weelung Creek, and the southern boundary of the fishing district is approximately four miles from Quinhagak at the southern mouth of the Arolik River. The western boundary of the fishing district is three miles from the coast. Commercial fishing occurs primarily in the tidal channels that radiate out into the bay from freshwater streams in the district.

Commercial fishing effort in District 4 has increased considerably in the last decade (Table 6). In the last two decades, the number of permit holders, fishing in District 4, has ranged from 117 in 1982 to a record high during the 1993 season of 409. The recent 10 year average is 323 permit holders. The shift of effort to District 4 may be due to the directed chinook salmon fishery, and changes in the June Kuskokwim River commercial fishery. However, in the last two years District 4 has had below average effort with 218 and 289 permit holders in 1996 and 1997, respectively. The lower number of permit holders participating in the fishery in the last two years may be attributable to lower fish prices. Also, in 1996 the initiation of the fishing season was delayed one week due to lack of processor interest.

## **District 5**

District 5 is the southernmost salmon district in the Kuskokwim Area (Figure 5). Fishing is done primarily with drift gillnets in tidal channels in Goodnews Bay and a few set gillnets near the mouth of the bay. The number of commercial fishers peaked in 1988 when 125 permit holders fished and the recent 10 year average is 95 permit holders (Table 7). However, in the last two years participation has been below the 10 year average, with 53 and 54 permit holders in 1996 and 1997, respectively. The lower number of permit holders participating in the fishery in the last two years may be attributed to lower fish prices.

### ***Sport Fishery***

The Sport Fish Division in Dillingham manages all sport fisheries from the Goodnews River to and including the Aniak River drainage. The remaining Kuskokwim River drainage is managed by the Sport Fish Division in Fairbanks. Overall, sport fishing activity and harvest is relatively low, but growing. The number of angler-days has increased from 11,358 in 1985 to 16,289 in 1995 (Howe et al. 1996). Moderate sport fishing activity occurs in Kanektok, Goodnews, Kisaralik and Aniak Rivers, which account for the majority of the total angler-days in the Kuskokwim Area.

## **ESCAPEMENT MONITORING AND ASSESSING RUN ABUNDANCE**

The vast size, remoteness, and fluvial diversity of the Kuskokwim Area presents tremendous challenges to monitoring salmon escapements and assessing run abundance. Aerial spawning ground surveys have been the most cost effective means of monitoring salmon escapements, but they have limited usefulness and reliability. The more thorough and rigorous ground based projects such as weirs, counting towers and sonar have been operated in a few locations, but until recently lack of funding has prohibited an expansion of such projects. Over the past few years a growing number of weir and counting tower projects have been developed through cooperative partnerships with various non-ADF&G organizations (Table 8). These cooperative ventures have made a substantial improvement in the department's ability to assess salmon escapements and to evaluate the effectiveness of inseason management actions.

Salmon managers require timely appraisals of run abundance in order to effectively prosecute commercial and subsistence fisheries without jeopardizing escapement needs. Escapement projects are of limited usefulness for inseason management of the Kuskokwim River commercial fishing districts because of the great distances between the areas of harvest and the location of escapement projects. It may take weeks for salmon to travel between these locations. As a consequence, managers in the Kuskokwim River rely on a variety of inseason indicators to assess run abundance

including test-fisheries, commercial catch statistics and verbal reports from subsistence and sport fishers. In Kuskokwim Bay the escapement monitoring projects are within a short distance of the commercial fishing districts, so escapement data can be used more effectively for inseason management decisions. Kuskokwim Bay managers also make extensive use of commercial catch statistics and information from subsistence, and sport fishers.

### ***Aerial Surveys***

Aerial surveys are the most cost effective method of assessing salmon escapements over a wide geographic area. The surveys are mostly conducted one time each season during a window of just a few days when the maximum number of fish are expected to be on the spawning grounds. Aerial surveys were the basis for many of the provisional escapement objectives established for Kuskokwim Area streams in 1983 (Buklis 1993). These objectives are more recently described as biological escapement goals (BEGs). Those BEGs derived from aerial surveys are not intended to represent the entire spawning populations. The BEGs developed from these surveys are based on “peak” counts within defined sections or index areas of the stream. Therefore, aerial counts serve as an index of abundance rather than a total population estimate.

Aerial surveys are generally restricted to clear water streams and lakes, the distribution of which is geographically skewed towards the lower Kuskokwim River basin and coastal streams. Tributaries in the middle and upper Kuskokwim River are more often tannin stained or clouded by glacial runoff, both of which markedly reduce the visibility of fish. The list of streams with BEGs reflects the uneven geographic distribution (Table 9; Buklis 1993).

In most cases, aerial surveys are best used to index spawning populations of sockeye and large chinook salmon because they are more visible. Some streams do have aerial survey based BEGs for chum salmon (Buklis 1993), but these are often of questionable usefulness because of protracted run timings and the low visibility of chum salmon on the spawning grounds. A few streams also have BEGs for coho salmon, but weather conditions seldom allow reliable aerial surveys to be flown during the coho season.

### ***Ground Based Escapement Monitoring***

Weirs, counting towers and sonar projects operated in the Kuskokwim Area allow enumeration of entire spawning populations, or at least major segments of those populations. Seven such projects were operated in 1997 (Figure 1). Three of the projects have BEGs associated with them, but only one, the Kogrukluk River weir, has a BEG for coho salmon (Table 10). Most of the BEGs are based on the average annual escapements at each site through about 1983 (Buklis 1993). Additional information collected at ground based projects may include salmon sex and length composition, scales for age determination, statistics on the occurrence of gillnet marks on fish, genetic stock identification samples, information on resident species, and habitat monitoring.

## **Kuskokwim River**

**Kogrukluk River Weir.** The Kogrukluk River is a middle Kuskokwim River tributary located in the upper reaches of the Holitna River drainage (Figure 1). The department has operated a weir on the Kogrukluk River since 1976 to monitor passage of chinook, sockeye, chum and coho salmon (Cappiello and Burkey 1997). The BEGs for the weir are 10,000, chinook, 30,000 chum, and 25,000 coho salmon. The BEG for sockeye was eliminated in 1993 because the Kogrukluk River was not considered to be an adequate index of sockeye production and are not actively managed in the Kuskokwim River. Prior to 1993, the sockeye salmon BEG was exceeded without direct management actions. Sockeye escapement sometimes exceeds that of other salmon species (Table 10). Kogrukluk River weir is the only project in the Kuskokwim Area where coho escapement is regularly monitored.

One of the earliest escapement monitoring projects in the Kuskokwim Area was a counting tower operated on the Kogrukluk River from 1969 through 1976 (Baxter 1977). The department first tried to weir the river in 1971, but was unsuccessful (Yanagawa 1972). Both the tower and the 1971 weir site were located several miles upstream of the current weir project. These early projects were also upstream of Shotgun Creek, a productive salmon spawning ground. The current weir project is downstream of Shotgun Creek.

Travel time for chum and coho salmon from the upper end of District 1 to the weir is estimated at about 25 days based on tagging studies conducted in the early 1960's (ADF&G 1961a and 1962a). Run timing models, based on historical data, are used to make inseason escapement projections and are also used to estimate passage when the weir is not operational (Cappiello and Burkey 1997). These projections have limited reliability during the first few weeks of the commercial fishing season and play a minor role in management decisions.

**Aniak River Sonar.** Aniak River is located in the lower Kuskokwim River basin and is believed to be one of the largest producers of chum salmon in the Kuskokwim Area (Figure 1). The department began a sonar project on the Aniak River in 1980. The travel time for chum salmon from the upper end of District 1 to the sonar site is estimated at about 7 or 8 days based on tagging studies (ADF&G 1961a and 1962a).

The sonar passage estimate includes a mix of species, however, the typical operating period focuses on a time span from late June through late July when the majority of passage is believed to be chum salmon. This assumption has generally been confirmed through periodic netting activities (Schneiderhan 1989, Vania and Huttunen 1997). During the first few years of operation, fish passage was apportioned to chum and chinook salmon by using the proportion of each species caught in gillnets (Schneiderhan 1981, 1982a, 1982b, 1984). Species apportionment was discontinued after 1984 because of gillnet selectivity and the observation that the numbers of chum salmon vastly dominate chinook numbers (Schneiderhan 1989).

Non-configurable sonar equipment was used in the Aniak River from 1980 through 1995. A transducer was deployed from one bank and passage in the unensounded section of the river was estimated using a conversion factor (Schneiderhan 1989). In 1996 the project was redesigned to take advantage of user configurable sonar technology (Vania and Huttunen 1997). At the same time, the project was relocated about a mile downstream where a transducer was deployed from each bank to allow full channel ensounding. The Association of Village Council Presidents has also provided a technician to assist in field operations the past two years.

The BEG for Aniak River sonar is 250,000 fish counts (Buklis 1993). Area biologists derived the goal subjectively in the early 1980's by relating the historical sonar passage estimates to trends in harvest and other escapement indices (Schneiderhan 1984). In the years that followed, periodic consideration of the BEG provided no compelling reason to change the goal. The median annual fish passage during the years when the project was operated from one bank with non-configurable equipment is 253,000 fish counts (Table 10). Average passage in the past two years with the user configurable equipment is 282,000 fish counts. The BEG of 250,000 counts has been carried forward to the redesigned sonar project, but it will be reassessed as more information is gathered.

***Other Kuskokwim River Escapement Projects.*** A number of other ground based escapement projects have been operated periodically in the Kuskokwim drainage. The most intensive efforts occurred in the past few years through cooperative ventures with the U. S. Fish and Wildlife Service (USFWS), the Bering Sea Fishermen's Association (BSFA) and other organizations. Cooperative escapement projects were operated in 1997 on the Kwethluk, George, and Takotna Rivers through partnerships with the Association of Village Council Presidents, Kuskokwim Native Association, and Takotna Community School, respectively (Figure 1). These groups received federal funding through a grant obtained by the BSFA. The department and USFWS worked jointly to provide varying levels of support to each project ranging from an on-site crew leader to equipment and technical guidance.

The George River weir and the Kwethluk River tower were each in their second year of operation in 1997, Takotna River tower was in its third year. The projects were generally operated only through the chinook and chum salmon runs, however, George River weir was continued through most of the coho run in 1997. Low numbers of sockeye salmon have been observed at all three locations. None of the cooperative projects have BEGs associated with them. All three projects are expected to operate in 1998, if funding is available.

Other weir and sonar projects have been operated in the Kuskokwim River basin over the years, but they were discontinued due to funding shortages, the lack of local public support, or technical limitations (Kwethluk River: Schneiderhan 1979, Harper in press; Kasigluk River: Schneiderhan 1980; Tuluksak River: Harper 1995a, 1995b, 1995c; South Fork Salmon River: Schneiderhan 1982c, 1982d).

## **District 4**

***Kanektok River Tower.*** The Kanektok River is the main spawning stream in District 4 (Figure 1). Prior to 1997, aerial surveys were the primary means of assessing spawning ground escapements in the river. A counting tower was initiated in the lower Kanektok River in 1996, and successfully executed in 1997 for enumerating chinook, sockeye, chum and pink salmon. The project was operated through a cooperative agreement between Quinhagak IRA and ADF&G. Other cooperating groups included BSFA, USFWS and the Bureau of Indian Affairs (BIA). The Kanektok River tower does not have any BEGs associated with it. The tower project is expected to be funded in 1998.

Counting towers and sonar projects have been attempted in the Kanektok River in past years, but they were discontinued due to site limitations and technical obstacles (tower: ADF&G 1960, 1961b and 1962b; sonar: Schultz and Carey 1982, Schultz and Williams 1984, Huttunen 1984a, 1985, 1986, 1988).

## **District 5**

***Middle Fork Goodnews River Weir.*** The Goodnews River is the primary salmon spawning stream in District 5 (Figure 1). Escapement is assessed in the drainage by means of a weir on the Middle Fork Goodnews River and aerial surveys. The weir is located about 15 miles from the eastern boundary of the commercial fishing district. The proximity allows for timely escapement assessment for effective inseason management. A fixed picket weir has been operated on the river since 1991. It was preceded by a counting tower that operated from 1981 through 1990 (Burkey 1990). The weir and tower projects monitor passage of chinook, sockeye and chum salmon. The BEGs are 3,500, 25,000 and 15,000 fish, respectively (Buklis 1993). Post-season estimates are made of the salmon spawning populations for the entire Goodnews River drainage based on the proportion of fish seen during aerial surveys relative to weir passage (Burkey et al. 1997).

Historically, assessment of coho escapement on the Middle Fork Goodnews River has not been successful due to funding limitations and poor operating conditions. However, in 1997 a resistance board weir was installed on the river which allowed operations to continue through the coho run. The floating weir was purchased, fabricated, and installed through a cooperative effort between ADF&G and USFWS. Additional assistance was also provided by BSFA.

### ***Salmon Run Strength Assessment***

Escapement projects in the Kuskokwim River are of limited usefulness for timely appraisals because of the distances between the areas of harvest and the spawning grounds. As a consequence, managers rely on test-fisheries, commercial catch statistics, and verbal reports from subsistence and sport fishers to augment escapement data.



In Kuskokwim Bay, the escapement monitoring projects are within a much shorter distance of the commercial fishing districts, so escapement data can be effectively used for inseason management. Kuskokwim Bay managers also make use of commercial catch statistics and information from subsistence and sport fishers. Catch statistics and anecdotal information are especially important in District 4 where reliable escapement monitoring has been lacking.

### **Bethel Test Fishery**

Daily inseason assessment of salmon run strength and timing is available from a drift gillnet test fishery operated on the Kuskokwim River near Bethel. The Bethel test fishery is located at river mile 80, which is about the mid-point of District 1 (Figure 2). The project began in 1984 and the methodology has remained nearly unchanged since its inception (Molyneaux 1994). From about 1 June through late August the test-fish crew repeat their routine one hour after each high tide. Twice a day, three or four 20 minute gillnet drifts are conducted with 50 fathom nets deployed at three stations across the channel. Two gillnets are used, each with a different mesh sizes: 5-3/8 and 8 inch. Both mesh sizes are operated from 1 June through about 10 July when chinook, sockeye and chum salmon all occur in relatively good abundance. The chinook run is nearly complete by 10 July, so use of the 8 inch mesh is discontinued. Test fishing with the 5-3/8 inch web continues until late August.

The test-fish catch from each tide is counted, speciated and sold to a local fish buyer or distributed to charities. Catch statistics for chinook, sockeye, chum and coho salmon are presented as daily catch-per-unit-effort. Comparisons are made with test-fish results from previous years to assess abundance and run timing. The assessments are subjective in that managers need to consider variables such as water level, fishing patterns and changing river morphology when comparing data from between years, and even within years.

Historically, other test fisheries have been attempted in the Kuskokwim River: Kwegoooyuk test fishery, 1966 - 1983 (Baxter 1970, Huttunen 1984b); Eek test fishery, 1988 - 1994 (unpublished); Kuskokwim River subsistence test fishery, 1988 - 1990 (Kuskokwim Fishermen's Cooperative, 1991); Aniak test fishery, 1992 - 1995 (unpublished); Chuathbaluk test fishery, 1992 - 1993 (unpublished); and the Lower Kuskokwim River test fishery, 1995 (unpublished). Most of these projects were initiated at the prompting of groups other than ADF&G. They were all eventually discontinued for a variety of reasons including lack of funding, problems with consistency, difficulties with catch disposition, and ambiguous results.

### **Commercial Catch Statistics**

Comparison of commercial catch statistics is another common method for assessing run strength. However, the usefulness of this approach can be confounded by inconsistencies in the number of participating fishers, the duration of commercial fishing periods and other variables that might influence catch or the effort applied by fishers. The practicality of this approach is also limited by

the need to harvest thousands or tens of thousands of salmon while risking not achieving escapement objectives, in order to make an assessment.

### **Subsistence and Sport Fish Information**

Throughout each season staff keep in close communication with subsistence and sport fishers about their fishing success and whether subsistence fishers have been able to meet their needs. These catch reports sometimes play a pivotal role in management decisions.

### **Kuskokwim River Sonar**

The department began developing a configurable sonar project in 1988 for deployment in the main stem of the Kuskokwim River near Bethel (Mesiar et al. 1994). That project became operable in 1993, but shortages in technical support and the restructuring of the Regional sonar program precluded operation of the project after 1995. The Kuskokwim River sonar project is schedule to restart within the next few years as part of the regional sonar rebuilding program.

## **SUMMARY OF THE 1997 SEASON**

Poor returns of chum and coho salmon coupled with low prices resulted in the lowest harvest and lowest exvessel value for Kuskokwim Area salmon fisheries since 1975 (Tables 1 and 11). In 1997, 702 of the 832 Kuskokwim Area permit holders made at least one landing. This was the lowest number of permit holders that fished in the Kuskokwim Area since 1984 when documentation of this statistic began (Table 11). The total commercial catch was 47,990 chinook, 123,002 sockeye, 67,200 chum, 7 pink, and 166,648 coho salmon (Table 12). The chinook salmon catch was 14% below the average catch of 55,688. The sockeye salmon catch was 27% below the average of 168,027. The chum salmon catch was the lowest since 1970 at 88% below the average of 577,110. The pink salmon catch was well below the odd year average of 379. The coho salmon catch was the lowest since 1976 at 75% below the average of 663,102. The total Kuskokwim Area commercial harvest of 404,847 salmon was 73% below the ten-year average, the lowest since 1975.

Kuskokwim Area permit holders received \$1,058,808 for their catch, excluding bonuses and other incentives not reported on fish tickets (Table 11). The value of the catch was the lowest since 1975 at 81% below the previous 10 year average of \$5,449,861. The average income per permit holder was \$1,508, the lowest on record and 78% below the ten year average of \$6,757. The prices paid per pound were low throughout the season (Table 13). The price per pound for chinook salmon was \$0.28 this year, well below the average of \$0.69. The \$0.42 price per pound paid for sockeye salmon was less than half the average of \$0.89. Pink salmon brought \$0.10 a pound, just below the average price of \$0.12. The price of \$0.12 per pound for chum salmon was

the second lowest since 1972, less than half the average of \$0.27. The price of \$0.33 per pound for coho salmon was about half the average price of \$0.60.

As mentioned previously, due to the methodology of subsistence catch data collection, results for 1997 are not available. The estimated subsistence catch for the Kuskokwim Area in 1996 was 82,353 chinook, 35,198 sockeye, 90,762 chum salmon, and 35,154 coho. The subsistence harvests of chinook, sockeye, coho and chum salmon were 6%, 12%, 13% and 23% below their previous 8 year averages (Table 1).

### ***Kuskokwim River (Districts 1 and 2)***

The Working Group continued to work closely with the department in 1997. During the season the Working Group met 18 times to evaluate the status of the salmon runs and make recommendations to the department (Table 14).

There was a total of five commercial fishing periods in District 1, and two periods in District 2 (Table 15). The first period in District 1 was on 23 June and the last on 18 August. District 2 was open on 12 and 18 August. The low number of commercial fishing periods was caused by weak chum and coho salmon returns. Total effort (permit-hours) in District 1 was the lowest since 1965, and a record low in District 2 for years when fishing occurred (Table 16).

### **Chinook Salmon**

Since 1987, the chinook salmon catch has been incidental to the chum salmon fishery in Districts 1 and 2. In 1997, the commercial harvest of 10,441 was well below the recent 10 year average of 33,648 (Table 3). This was primarily due to the limited fishing time during the chum salmon fishery. Ninety-six percent of the total chinook harvest was taken in the first period in District 1.

Total estimated value of the chinook salmon harvest in the Kuskokwim River was \$36,888 (Table 12). This was only 11% of the 1988-1996 average. Prices per pound ranged from 0.25 in the first period to \$0.58 in the last period, with an overall average of \$0.26

With a relatively late start of the commercial fishery and fewer openings, the total Kuskokwim River drainage escapement index for chinook salmon was achieved in 1997 (Figure 6). Chinook salmon escapement goals were achieved at the Kogrukluk River weir (Table 10) and in 7 of the 10 aerial survey index streams that were surveyed (Table 9).

### **Sockeye Salmon**

In 1997, the commercial harvest of 21,989 sockeye salmon was well below the recent 10 year average of 76,016 (Table 4). This was primarily due to the limited fishing time during the chum

salmon fishery. The total estimated value of \$64,926, was 15% of the 1988-1996 average. Prices per pound ranged from \$0.40 in the first period to \$0.56 in the second period with an average of \$0.41. Sockeye salmon escapement is documented ancillary to the other species. The Kogrukluks weir escapement estimate of 13,062 sockeye salmon in 1997 was above average (Table 10).

## **Chum Salmon**

By all indicators, the return of chum salmon to the Kuskokwim River in 1997 was the lowest on record. The 1997 pre-season outlook was for a below average chum salmon run. The return of five year old fish, from the 1992 escapement, were expected to be average based on their return as four year old salmon in 1996. The four year old chum salmon from the 1993 brood year were expected to be below average in abundance based on low parent year escapement. At the Kogrukluks River weir, parent year escapements exceeded the objective in the 1992 and 1993 brood years (Table 10). Escapement past the Aniak River sonar was well below objective in 1992 and 1993.

Run assessment through mid-June showed weak chum and chinook salmon abundance. Consequently, on 13 June the Working Group and the department decided not to set a commercial fishing period. At the 16 June meeting the Working Group recommended that the department continue to evaluate the salmon runs and determine the date for the first commercial opening. By 20 June, subsistence catches and the Bethel test fishery showed increasing chinook and chum salmon run strength. The department opened the commercial fishery on 23 June for 6 hours downstream of Bethel in compliance with the management plan. The catch of 13,090 chum salmon was the lowest on record for that date. The chinook and sockeye catches were about average for that date. For the remainder of the season, run strength indicators showed the chum salmon return to be well below average. In early July it became evident that further harvest of chum salmon would seriously reduce our ability to meet escapement needs for that species. On 9 July, the department closed the commercial and sport fisheries for chum salmon in the Kuskokwim River drainage for the rest of the season. From 14 July until 28 July the northern boundary of District 4 was reduced in order to minimize possible interception of Kuskokwim River chum salmon.

On 15 July, due to the extremely weak return of chum salmon, subsistence users were asked to voluntarily reduce their take of chum salmon. The department, Association of Village Council Presidents, Kuskokwim Native Association, Kuskokwim River Salmon Management Working Group, McGrath Native Village Council, Orutsararmuit Native Council and Tanana Chiefs Conference issued an unprecedented cooperative appeal for subsistence users to help conserve chum salmon. Based on verbal reports, it appears that subsistence fishers complied with the appeal and many compensated by increasing their coho harvest.

District 1 had one commercial fishing period during the chum salmon season and District 2 had no commercial openings targeting chum salmon (Table 15). A total of 17,026 chum salmon were harvested by 607 permit holders. This was only 3% of the most recent 10 year average chum

salmon harvest (Table 4). The average price per pound for chum salmon was \$0.16 making the exvessel value of the catch worth \$19,509 (Table 12).

Run assessment projects indicated that the overall chum salmon escapement in the Kuskokwim River was poor for 1997. The chum salmon escapement estimate at the Kogrukluk River weir was only 26% of the 30,000 fish BEG. Aniak River sonar counts, however, exceeded the escapement objective for that system. Chum salmon counts at the George River weir, Kwethluk River tower and Takotna River towers were 66%, 61% and 36% below their respective levels in 1996 (Table 10).

### **Coho Salmon**

The return of coho salmon to the Kuskokwim River in 1997 also appears to be one of the lowest on record. Based on the strength of the coho salmon run, the department and the Working Group agreed to reopen the commercial fishery on 31 July for 6 hours. To reduce the catch of chum salmon, fishing was restricted to the lower half of District 1 during the first coho opening. The coho catch of 14,963 was the second lowest for that date since 1980. The next two periods on 6 August and 12 August produced the lowest catches for their respective dates since 1980. The number of permit holders fishing in District 1 was slightly below average while the number of permit holders in District 2 was about one-fifth historical levels due to the lack of a buyer in the District.

The Working Group set a total of four fishing periods in District 1 and two periods in District 2 during the 1997 coho salmon season (Table 15). During the management of coho salmon, the Working group agreed with the department's recommendation to fish for 6 hours for all periods. The Kuskokwim River remained closed to commercial fishing after the 18 August period, well before the regulatory closure on 1 September. A total of 597 permit holders harvested 130,803 coho salmon in the Kuskokwim River districts.

The coho salmon escapement estimate at the Kogrukluk River weir was 12,312 fish, only 49% of the BEG (Table 10). The commercial fishing effort in District 2 had been fairly consistent and this provided a CPUE that correlated with escapement at the Kogrukluk River weir. An average CPUE for periods between 1 August and 21 August of 43 or greater occurred when the escapement goal was reached (Figure 7). However, despite a CPUE of 40 in District 2 in 1997, coho escapement was well below expectations based on the historical correlation. This inconsistency was probably due to the much lower than normal participation in District 2.

Chum salmon are an incidental catch in the chinook and sockeye salmon commercial fisheries in District 4. The 1997 chum salmon catch of 38,445 was 26% below the recent 10 year average of 51,948 fish (Table 6). The average price per pound was \$0.11 for chum salmon and the exvessel value was estimated at \$30,877 (Table 12). The counting tower escapement estimate of chum salmon was 51,180. This estimate was 47% below the sockeye salmon escapement estimate. This compares well with the chum salmon commercial catch which was 45% below the sockeye salmon catch, assuming there is no gear selectivity and the majority of the fish caught were bound for the Kanektok River. In an aerial survey done after peak spawning, 3,270 chum salmon were observed (Table 18).

The directed coho salmon fishery began after the 30 July opening in which coho salmon catch surpassed sockeye salmon catch. On 1 August the number of permit holders participating in the fishery was approximately 25% of the normal level. This was due to a strike over coho salmon prices, which had been reduced from \$0.45 per pound to \$0.25 per pound. Participation returned to normal levels the next commercial period, on 4 August, and the following week (13 August) the price was raised to \$0.35 per pound. Commercial catches when compared with historical catches indicated a below average coho salmon run. Following below average catches of coho salmon for two consecutive periods, fishing time was reduced from three periods per week to two periods per week on 11 August. Average catches of coho salmon prompted a return to three periods per week on 18 August. However, below average catches again resulted in reduced fishing time of two periods per week the last week of August. The last commercial fishing period was on 3 September, but there was no buyer, and the commercial fishery closed by regulation on 8 September. The 1997 coho salmon catch of 32,862 was 49% below the recent 10 year average of 64,383 fish (Table 6). Permit holders were paid an average of \$0.34 per pound. The exvessel value of coho salmon in District 4 was estimated at \$92,396 (Table 12). The counting tower ceased operations on 21 August due to high water creating poor visibility, and 23,172 coho salmon had been enumerated. In an aerial survey done after peak spawning, 5,192 coho salmon were observed (Table 18).

The 1997 District 4 harvest of 176,384 salmon was 12% below the recent 10 year average of 201,561 salmon (Table 6). The total exvessel value of \$498,953 was 44% below the recent average (Table 12).

## **District 5**

In 1997, District 5 opened to commercial fishing on 27 June (Table 19). Over the last five years the management strategy has been to delay the first opening until the last week of June as an attempt to increase escapement of chinook salmon into the Goodnews River drainage. This strategy has resulted in the escapement goal of 3,500 chinook salmon, past the Middle Fork Goodnews River weir, being met twice in the last five years. In 1997, the escapement of 2,937 chinook salmon was 16% short of the goal. An aerial survey of the main fork and middle fork of the Goodnews River enabled main fork escapement to be estimated at 7,216 chinook salmon (Table 20). The commercial harvest of 2,039 chinook salmon was 27% below the recent 10 year

harvest of 2,801 fish (Table 7). Permit holders were paid an average of \$0.34 per pound and the exvessel value was estimated at \$10,867 (Table 12).

The sockeye salmon directed fishery in late June and the first few weeks of July in District 5 produced average catches, but catches after mid-July fell below average. Commercial fishing continued for three 12-hour periods per week until the last week of July when processor availability was limited and fishing was therefore reduced to two 12-hour periods per week for the rest of the season. The commercial harvest in 1997 was 31,451 sockeye salmon which was 20% below the recent 10 year average of 39,513 fish (Table 7). Sockeye salmon prices averaged \$0.42 per pound and the exvessel value was estimated at \$93,146 (Table 12). The escapement goal of 25,000 sockeye salmon past the weir was met on 12 July and the escapement for the season was 35,530 fish. An aerial survey enabled the main fork of Goodnews River escapement to be estimated at 23,462 sockeye salmon (Table 20).

The chum salmon catch is incidental to the sockeye salmon fishery in District 5. The 1997 catch of 11,729 fish was 37% below the 10 year average of 18,473 fish (Table 7). Permit holders were paid an average of \$0.11 per pound for chum salmon and the exvessel value was estimated at \$9,358 (Table 12). The chum salmon escapement at Middle Fork Goodnews River weir of 17,296 fish exceeded the goal of 15,000 fish (Table 20).

The 1997 coho salmon catch of 2,983 was the third lowest on record and 89% below the recent 10 year average of 26,195 fish. Management for coho salmon began after the 11 August opening, when the coho salmon catch exceeded the sockeye salmon catch. The 11 August catch of 163 coho salmon was a record low for that date. Due to extremely low harvests, commercial fishing continued to be restricted to two 12-hour periods per week. On 25 August, Fish and Wildlife Protection issued citations to 6 permit holders for fishing outside of Goodnews Bay (Figure 5). This incident combined with previous low catches of coho salmon led the department to suspend commercial fishing in District 5 until further notice. After 28 August there was no processor interest in buying fish and the District 5 commercial fishery closed by regulation on 8 September. Permit holders were paid an average of \$0.34 per pound and the exvessel value was estimated at \$9,497 (Table 12).

The 1997 District 5 harvest of 48,202 salmon was 47% below the recent 10 year average of 90,856 salmon (Table 7). The total exvessel value of \$122,867 was 72% below the recent average (Table 12).

In late July 1997, a resistance board “floating weir,” was installed on the Middle Fork Goodnews River. This weir proved better able to handle the high water flows that came with the autumn rains. Despite several high water periods the weir remained operational until 17 September. This was the first season that the project was operational in September and 39% of the 9,617 coho salmon enumerated were counted in that month. Before 1997, the latest operational date was 28 August. No BEG has been established due to the limited coho escapement data. High water and poor flying conditions during late August and September prevented aerial surveys of coho salmon escapement.

## OUTLOOK FOR 1998

The Kuskokwim Area has no formal forecast for salmon returns. Broad expectations are developed based on an evaluation of parent year escapements and trends in harvest and productivity. Harvest expectations are described using a loose interpretation of the statistical quartiles of the past ten years of harvest performance as a general guideline. Readers should be cautioned that these outlooks are subjective and have a high level of uncertainty associated with them.

### *Chinook Salmon*

Most chinook salmon return to the Kuskokwim Area at age six, five, or four (Molyneaux and DuBois 1996), so the primary brood years for the 1998 return will be 1992, 1993 and 1994. Chinook salmon escapement is monitored in the Kuskokwim River drainage by aerial surveys and Kogrukluk River weir. A limited amount of brood year data is also available from projects operated on the Tuluksak and Kwethluk Rivers. In Kuskokwim Bay, chinook escapement is monitored by aerial surveys and a weir on the Middle Fork Goodnews River.

### **Districts 1 and 2**

The timing of the chinook migration through Districts 1 and 2 of the Kuskokwim River overlaps broadly with the chum salmon migration. Since 1987 the commercial fishery has been directed at the more abundant chum stocks through gear, time and area restrictions. Managers further delay or restrict the commercial chum fishery when concerns about chinook abundance, or subsistence needs, warrant additional conservation measures (e.g., Francisco et al. 1988, 1990 and 1991). The incidental chinook harvest in the commercial fishery is therefore linked to both the abundance of chinook and chum salmon. Market interest in chum salmon is also an important variable that drives the incidental chinook harvest.

The return of chinook salmon to the Kuskokwim River in 1998 is expected to be near average abundance based on parent year escapements (Table 9 and 10). In 1992 Kogrukluk River escapement was 32 percent below the BEG, and four of eight aerial survey objectives<sup>2</sup> were achieved. In 1993 commercial fishing was minimal due to low chum salmon abundance. Consequently, chinook escapement was augmented over what would have otherwise been available with more normal commercial fishing effort (Francisco et al. 1994). Passage at Kogrukluk River weir was above the BEG in 1993, but aerial survey objectives were still only achieved in five of nine streams. Commercial fishing was again limited during the early portion of the 1994 season and benefits to chinook escapement were more apparent (Anderson et al.

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<sup>2</sup> Aerial survey objectives as used here include official BEGs and the median historical counts for streams surveyed that do not have a BEG.



of the 1994 season and benefits to chinook escapement were more apparent (Anderson et al. 1994). Kogrukluk River chinook escapement was well above the BEG, and six of eight aerial survey objectives were achieved that year. Chinook escapements in the Tuluksak River had a similar pattern of increasing numbers from 1992 to 1994. These brood year escapements should result in a good return of the smaller sized age four and five chinook which are predominantly male (Molyneaux and DuBois 1996). The larger sized and female dominated age six component should be less abundant. Subsistence users tend to prefer the larger chinook. If markets and fishing effort allow, the potential incidental commercial harvest of chinook salmon could be in the range of 20,000 to 40,000 fish (Table 21).

#### **District 4**

District 4 currently has the only directed commercial chinook salmon fishery in the Kuskokwim Area and fishers use gillnets with mesh size restricted to 6 inches or smaller. The chinook run timing overlaps with the migration of sockeye and chum salmon, but the commercial fishery remains targeted on earlier running chinook as long as that species dominates the catch.

The only means of assessing brood year escapement for District 4 chinook is from aerial surveys of the Kanektok River. The aerial survey indexes were below the BEG in 1992 and 1993, but above in 1994 (Table 18). The harvest trend in recent years has been variable with 1995 and 1997 being well above average, while 1994 and 1996 were below average. Based on the harvest trends and the brood year escapements, the 1998 return is expected to be average or below average. Market interest has sometimes been a problem in District 4, and fishing periods are occasionally lost due to a lack of tender availability. The number of permit holders participating in the Quinhagak fishery has generally been on the rise, but effort in the past two seasons has been below the 10 year average (Table 6). If markets and effort levels remain steady, harvest may be between 10,000 and 20,000 chinook in 1998 (Table 21).

#### **District 5**

In District 5, the status of chinook stocks has been a concern for the past several years. The commercial fishery is directed at sockeye salmon, but the migratory timing of the two species overlap, with chinook running earlier. The first commercial fishing period is generally delayed as a conservation measure to bolster chinook escapements. Escapement has improved modestly in the Middle Fork Goodnews River, but passage at the weir still tends to be below the BEG in most years (Table 10). Escapements were below the BEG in the brood years of 1992 and 1993, but marginally above the BEG in 1994.

The incidental chinook harvest is driven by the level of early season effort allowed in the sockeye fishery. Market interest and tender availability are also sometimes limiting. The chinook returns are expected to continue to be relatively low in Goodnews Bay. Conservation measures will still be necessary in order to continue the chinook rebuilding program. The incidental commercial harvest is expected to be between 2,000 and 2,500 chinook salmon (Table 21).

## ***Sockeye Salmon***

Sockeye salmon return primarily at age five in the Kuskokwim Area (Molyneaux and DuBois 1996), so the 1998 returns will be derived mostly from the 1993 brood year. In the Kuskokwim River, commercial harvest of sockeye is incidental to the directed chum fishery. Kuskokwim Bay districts, however, do support sockeye directed commercial fisheries.

The relatively poor sockeye production witnessed in some regions of the state this past summer (Buckley 1997) did not appear to extend to most of the Kuskokwim Area. The sockeye escapement to Kogrukluk River was above average in 1997, as has been the trend for the past several years (Table 10). Subsistence fishers reported good sockeye catches in the Kuskokwim River. The sockeye harvest in Districts 4 was also above average in 1997 (Tables 17).

### **Districts 1 and 2**

The span of time in which sockeye salmon migrate through the Kuskokwim River commercial fishing districts overlaps the chum migration. The commercial fishery is directed at the more abundant chum salmon. Sockeye salmon rarely factor into management decisions and escapement monitoring of sockeye is a low priority. The incidental sockeye harvest is therefore linked to both the abundance of sockeye and the abundance of chum salmon. Market interest in chum salmon is another important variable that drives the incidental sockeye harvest in the river.

Sockeye returns to the Kuskokwim River in 1998 are expected to be above average. Commercial fishing was minimal in the parent year due to chum salmon concerns, consequently good sockeye escapements likely occurred throughout the drainage. Indeed, Kogrukluk River, which is not considered a significant sockeye system, had record high sockeye escapement in 1993 (Table 10). Reports from subsistence fishers also confirmed that sockeye were generally abundant throughout the Kuskokwim River in 1993. The apparently good brood year escapement suggests that Kuskokwim River fishers can anticipate an above average abundance of sockeye salmon in 1998. If market interest and fishing effort for chum salmon allow, the potential incidental sockeye harvest could be in the range of 60,000 to 90,000 fish (Table 21).

### **District 4**

In District 4, the sockeye harvest is incidental to the directed chinook fishery for most of June. The commercial fishery switches to sockeye management by late June or early July when sockeye become dominant. Still, the run timing of the two species overlap broadly and the overall commercial sockeye harvest is partially dependent on chinook abundance.

Sockeye returns to District 4 are expected to be good in 1998. The brood year escapement, as indexed by aerial survey of the Kanektok River, was well above the BEG in 1993 (Table 18)

Harvest trends have also been consistently, if not dramatically, strong since 1990 (Table 6). The pattern of increased harvest that began in 1990 is likely due to a combination of factors including, increased sockeye productivity, increased fishing effort, and an expansion of the commercial fishing district. The average to below average expectation for chinook salmon returns in 1998 is liable to dampen the incidental sockeye harvest in June, but otherwise harvest for the overall season is expected to be strong and in the range of about 60,000 to 80,000 fish (Table 21).

## **District 5**

The sockeye run in District 5 overlaps with the earlier running chinook migration. The commercial fishery is directed at sockeye salmon, but the onset of that fishery is usually delayed as part of the chinook rebuilding plan. This management approach will continue to impact sockeye harvest in 1998.

District 5 is expected to have a good sockeye return in 1998. The 1993 brood year escapement past the Middle Fork Goodnews River weir was marginally above the BEG (Table 10). In addition, the trend has been towards above average escapements the past few years. Harvest levels have also been good to strong despite the impact of the chinook rebuilding plan. The harvest in 1998 is expected to be in the range of 30,000 to 50,000 fish (Table 21).

## ***Chum Salmon***

Chum salmon return to the Kuskokwim Area primarily at five and four years of age (Molyneaux and DuBois 1996), so 1993 and 1994 will be the main brood years for the 1998 returns. The commercial fisheries in Districts 1 and 2 of the Kuskokwim River target chum salmon. Chum catches in Districts 4 and 5 of Kuskokwim Bay, however, are incidental to fisheries directed at other salmon species.

## **Districts 1 and 2**

Average to below average numbers of chum salmon are expected to return to the Kuskokwim River in 1998. Spawning escapements for early running stocks are thought to be indexed by Kogrukluk River weir. Parent year escapement at the weir was marginally above the BEG in 1993 following strong management actions to minimize the chum harvest (Table 10). Escapement in the following year was well above the BEG. These escapements are expected to result in a good showing of chum salmon during the early portion of the 1998 season.

Aniak River chums are believed to enter the Kuskokwim River a little later than the stocks indexed by Kogrukluk River weir. Aniak River is believed to be one of the most important chum salmon producing streams in the area. The sonar passage estimate at Aniak River was well below

the BEG in 1993, despite strong conservation measures taken in the fisheries. In 1994 the passage estimate was well above the BEG. The critically low escapement in 1993 suggests that age five chum salmon from the Aniak River will be in low abundance, while the good escapement in 1994 should result in above average returns of the age four fish.

These expectations are confounded by the returns observed in 1997. Aniak River was expected to have a poor return of chum salmon this past season because of low brood year escapement in both 1993 and 1992; however, returns were much better than anticipated. In contrast, Kogrukluk River was expected to have near average chum salmon returns in 1997, but passage through the weir was the lowest on record despite negligible commercial harvest impacts. The chum salmon returns to the Kwethluk, George and Takotna Rivers in 1997 were also a fraction of what they had been the previous one or two years of operation, reinforcing the belief that the 1997 chum salmon failure was a drainage wide phenomenon. The reason for the reversal of returns between Kogrukluk and Aniak River is unknown, but it does give cause for additional uncertainty regarding the 1998 outlook. With that precaution in mind, the return of chum salmon to the Kuskokwim River in 1998 is expected to allow a below average to average harvest of 20,000 to 400,000 fish (Table 21). Poor market conditions and limited processor interest are additional concerns expected to persist in 1998.

#### **District 4**

Chum harvest in District 4 is incidental to fisheries directed at chinook and sockeye salmon. The run timings are concurrent between these species, but management focus is on chinook and sockeye salmon. Chum salmon are not generally integrated into management decisions, their incidental harvest is linked with the abundance of chinook and sockeye salmon.

Chum escapement in District 4 is traditionally monitored by aerial surveys of the Kanektok River. Survey counts have been chronically below the BEG index since 1984 (Table 18), but this is probably misleading. The BEG for chum salmon of 30,500 is twice the sockeye BEG of 15,000, but the average aerial count has the reverse ratio of about two sockeye for every one chum salmon. This same ratio was observed in the escapement estimates made from the counting tower operated on the Kanektok River in 1997 (Table 10); passage of sockeye was estimated at about 96,000 while chum passage was 51,000. The commercial fishery as well had a sockeye to chum ratio of about 2 to 1 (Table 6). The chum salmon BEG for the Kanektok River is currently under review and will likely be lowered to better reflect historical abundance levels.

The incidental commercial harvest of chum salmon in District 4 has generally been strong throughout the 1990's (Table 6). The increase is likely due to a combination of factors including increased fishing effort and an expansion of the commercial fishing district. Given the average to below average return expected for chinook salmon, and the strong returns expected for sockeye, the incidental chum harvest will likely be between 40,000 and 60,000 (Table 21).

## **District 5**

The chum salmon harvest in District 5 is incidental to the sockeye directed commercial fishery. The run timing of the two species is concurrent, but chum salmon are not generally integrated into the management decisions process. The incidental harvest of chum salmon is linked to the amount of fishing effort in the sockeye directed fishery.

Chum salmon escapement in District 5 is monitored at the Middle Fork Goodnews River weir. Escapement in the 1993 brood year was marginally below the BEG, but escapement in 1994 was more than twice the BEG (Table 10). Throughout the 1990's chum escapements have generally been good. The incidental chum harvests in the 1990's have also generally been good. The return of chum salmon to the district is again expected to be good in 1998, especially for the age four component. Considering the good sockeye return expected to the district, the incidental harvest of chum salmon is expected to be in the range of 15,000 to 30,000 fish (Table 21).

### ***Coho Salmon***

Coho salmon return to the Kuskokwim Area primarily at four years of age, so 1994 will be the key parent year for 1998 returns. There is very little information on which to base the coho salmon run outlooks. The Kogrukluk and Tuluksak River weirs were the only coho escapement projects operated in the Kuskokwim Area in 1994, and both projects are located in the Kuskokwim River basin. Market interest in coho salmon has been relatively good in the Kuskokwim Area and that trend is expected to continue in 1998.

## **Districts 1 and 2**

Average to above average numbers of coho salmon are expected to return to the Kuskokwim River in 1998. Coho escapement past Kogrukluk River weir was above the BEG in the parent year. Tuluksak River weir, which was in its fourth and final season of operation in 1994, was nearly tied for the highest coho passage in the projects brief history (Table 10).

Coho returns to the Kuskokwim River have generally been on the rise for the past several years. There has also been a cyclic tendency for even years to have a somewhat larger return than odd years. More recently returns have also been volatile. In 1996 harvest and escapement at Kogrukluk River were both at record high levels, but 1997 followed with record low harvest and escapement. Considering the cyclic pattern of Kuskokwim River coho salmon, coupled with good parent year escapement, the river may get an average to above average coho return in 1998, with a harvest in the range of 500,000 to 700,000 fish (Table 21). It should be emphasized that the level of uncertainty in the coho outlook is especially high given recent volatility and limited escapement assessment.

## **Districts 4 and 5**

Commercial harvest data are the only guide to anticipating coho returns in Districts 4 and 5. As was described for the Kuskokwim River, the trend in District 4 over the past several years has been towards increasing harvest coupled with a modest cycle of even year dominance (Table 6). The District 4 harvest also exhibited a pattern of volatility in 1996 and 1997 similar to what occurred in the Kuskokwim River. Based on these patterns, the 1998 return is cautiously expected to be average to above average with a harvest in the range of 50,000 to 90,000 (Table 21).

Coho harvest in District 5 has been variable the past several years (Table 7). The parent year harvest of 1994 was second best catch on record for the district. The outlook for 1998 is for an average harvest in the range of 10,000 to 30,000 coho (Table 21).

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## **TABLES**

Table 1. Historical commercial and subsistence salmon catches in the Kuskokwim Area, 1913-1997.

Year	Commercial Harvest						Subsistence Harvest				Total Harvest
	Chinook	Sockeye	Chum	Pink	Coho	Subtotal	Chinook	Other <sup>c</sup>	Coho <sup>b</sup>	Subtotal	
1913	7,800					7,800					7,800
1914		2,667				2,667					2,667
1915											0
1916	949					949					949
1917	7,878					7,878					7,878
1918	3,055					3,055					3,055
1919	4,836					4,836					4,836
1920	34,853					34,853					34,853
1921	9,854					9,854					9,854
1922	8,944	6,120				15,064				180,000	195,064
1923	7,254					7,254					7,254
1924	19,253	900		7,167	7,167	34,487	17,700	203,148		220,848	255,335
1925	1,644	5,800				7,444	10,800	230,850		241,650	249,094
1926										738,576	738,576
1927										286,254	286,254
1928										481,090	481,090
1929										560,196	560,196
1930	7,626	2,448				10,074				538,650	548,724
1931	8,541					8,541				389,367	397,908
1932	9,339					9,339				746,415	755,754
1933							6,290	443,998		450,288	450,288
1934							20,800	597,132		617,932	617,932
1935	6,448				8,296	14,744	22,930	554,040		576,970	591,714
1936	624					624	33,500	549,423		582,923	583,547
1937	480					480		537,111		537,111	537,591
1938	624				828	1,452	10,153	400,242		410,395	411,847
1939	134					134	14,000	125,425		139,425	139,559
1940	247				500	747	8,000	415,523		423,523	424,270
1941	187				674	861	8,000	415,523		423,523	424,384
1942							6,400	325,339		331,739	331,739

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Table 1. (page 2 of 3)

Year	Commercial Harvest						Subsistence Harvest				Total Harvest
	Chinook	Sockeye	Chum	Pink	Coho	Subtotal	Chinook	Other <sup>c</sup>	Coho <sup>b</sup>	Subtotal	
1943							6,400	325,339		331,739	331,739
1944											
1945											0
1946	2,288				674	2,962					2,962
1947	5,356					5,356					5,356
1948											0
1949											0
1950											0
1951	4,210					4,210					4,210
1952											0
1953											0
1954	57					57					57
1955											0
1956											0
1957											0
1958											0
1959	3,760					3,760					3,760
1960	5,969	5,649	3		5,498	17,119	18,887	301,753		320,640	337,759
1961	23,246	2,308	18,864	91	5,090	49,599	28,934	179,529		208,463	258,062
1962	20,867	10,313	45,707	4,340	12,598	93,825	13,582	175,304	161,849	350,735	444,560
1963	18,571				15,660	34,231	34,482	170,829	137,649	342,960	377,191
1964	21,230	13,422	707	939	28,992	65,290	29,017	219,208	190,191	438,416	503,706
1965	24,965	1,886	4,242		12,191	43,284	24,697	250,878		275,575	318,859
1966	25,823	1,030	2,610	268	22,985	52,716	49,325	175,735		225,060	277,776
1967	29,986	652	8,235		58,239	97,112	61,262	214,468		275,730	372,842
1968	43,157	5,887	19,694	75,818	154,302	298,858	35,698	278,008		313,706	612,564
1969	64,777	10,362	50,377	1,251	110,473	237,240	40,617	204,105		244,722	481,962
1970	65,032	12,654	60,566	27,422	62,245	227,919	69,612	246,810	11,868	328,290	556,209
1971	44,936	6,054	99,423	13	10,006	160,432	43,013	116,391	6,899	166,303	326,735
1972	55,482	4,312	97,197	1,952	23,880	182,823	38,176	120,316	1,325	159,817	342,640
1973	51,374	5,224	184,207	634	152,408	393,847	38,451	179,259	23,746	241,456	635,303
1974	30,670	29,003	196,127	60,052	179,579	495,431	26,665	277,170	32,780	336,615	832,046

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Table 1. (page 3 of 3)

	Commercial Harvest						Subsistence Harvest					Total	
Year	Chinook	Sockeye	Chum	Pink	Coho	Subtotal	Chinook	Other <sup>c</sup>	Coho <sup>b</sup>	Subtotal	Harvest		
1975	27,799	17,535	223,532	899	109,814	379,579	47,569	176,389		223,958	603,537		
1976	49,262	13,636	231,877	39,998	112,130	446,903	58,055	223,792	4,312	286,159	733,062		
1977	58,256	18,621	298,959	434	263,728	639,998	58,158	203,397	12,193	273,748	913,746		
1978	63,194	13,734	282,044	61,968	247,271	668,211	38,145	125,052	12,437	175,634	843,845		
1979	53,314	39,463	297,167	574	308,683	699,201	57,053	163,451		220,504	919,705		
1980	48,242	42,213	561,483	30,306	327,908	1,010,152	62,047	168,987	47,335	278,369	1,288,521		
1981	79,378	105,940	485,635	463	278,587	950,003	64,274	163,554	28,301	256,129	1,206,132		
1982	79,816	97,716	325,471	18,259	567,451	1,088,713	61,141	195,691	45,181	302,013	1,390,726		
1983	93,676	90,834	306,554	379	249,018	740,461	51,020	149,172	2,834	203,026	943,487		
1984	74,006	81,307	488,482	23,902	829,965	1,497,662	60,668	144,651	15,016	220,335	1,717,997		
							Chinook	Sockeye	Chum	Pink	Coho		
1985	74,083	121,221	224,680	111	382,096	802,191	45,720	33,632	95,999	1,062	24,524	1,003,128	
1986	44,972	142,029	349,268	16,569	736,910	1,289,748	54,256	20,239	142,930 <sup>c</sup>		29,742	1,536,915	
1987	65,558	170,849	603,274	163	478,594	1,318,438	71,804	25,180	70,709	291	18,085	1,504,507	
1988 <sup>dc</sup>	74,552	149,927	1,443,916	37,592	623,719	2,329,706	75,107	33,102	153,980		43,866	2,635,761	
1989 <sup>d</sup>	67,003	82,628	802,199	819	556,312	1,508,961	86,245	37,210	145,764		58,455	1,836,635	
1990	84,706	203,374	522,535	16,082	445,062	1,271,759	92,127	39,434	130,550		50,528	1,584,398	
1991	48,170	202,441	501,692	522	556,818	1,309,643	90,294	56,402	96,196		56,477	1,609,012	
1992	67,597	192,341	436,506	85,978	772,449	1,554,871	68,567	33,884	99,089		44,330	1,800,741	
1993	26,636	167,235	94,937	71	686,570	975,449	91,506	51,210	61,589		35,168	1,214,922	
1994	27,345	191,169	360,893	84,870	856,100	1,520,377	98,585	39,378	77,213		36,630	1,772,183	
1995	72,352	198,045	707,212	318	555,539	1,533,466	101,026	28,737	69,368		39,553	1,772,150	
1996	22,961	122,260	297,933	1,663	1,099,853	1,544,670	82,353	35,198	90,761		35,154	1,788,136	
1997	47,990	123,002	67,200	7	166,648	404,847							
10-Year Average							9-Year Average						
1987-96	55,688	168,027	577,110	379 <sup>f</sup>	663,102	1,486,734	1988-96	87,312	39,395	102,723	44,462	273,893	1,779,326

<sup>a</sup> Primarily chum and coho salmon.<sup>b</sup> Reported subsistence coho salmon harvest only. Coho salmon subsistence harvest is poorly documented with no Kuskokwim River estimates attempted prior to 1988.<sup>c</sup> Includes sockeye, pink and chum salmon.<sup>d</sup> The personal use catch is included with the subsistence catch.<sup>e</sup> Beginning in 1988, estimates are based on a new formula therefore data since 1988 is not comparable with previous years.<sup>f</sup> Odd years only.

Table 2. Kogrukluk River weir chinook salmon female composition and percent females with gillnet marks, 1979 - 1997.

Year	Total Escapement	Percent Females	Percent Females with Gillnet Marks
1979	11,338	17.8	11.03
1980	6,572	15.9	<sup>b</sup>
1981	16,655	47.0	12.47
1982	10,993	49.2	12.99
1983	2,992	28.9	16.49
1984	4,928	22.7	11.08
1985	4,619	32.2	18.99
1986	5,038	23.0	19.43
1987	4,063	<sup>a</sup>	<sup>a</sup>
1988	8,505	34.4	13.34
1989	11,940	34.6	16.46
1990	10,218	22.5	14.35
1991	7,850	46.6	19.26
1992	6,755	33.4	30.03
1993	12,332	28.2	11.25
1994	15,227	24.6	9.53
1995	20,630	46.0	12.5
1996	14,199	38.1	4.4
1997	13,285	33.3	9.1
1979-84 Mean		30.3	12.8
1985-96 Mean		33.1	15.4
Mean of All		32.1	14.3

<sup>a</sup> Sample size too small to assess sex ratio and percentage of gillnet marks.

<sup>b</sup> Gillnet-mark data was not collected.



Table 3. Utilization of Kuskokwim River chinook salmon, 1960 - 1997.

Year	Commercial Harvest <sup>a</sup>	Estimated Subsistence Harvest <sup>b</sup>	Total Utilization	Running 10-Year Average
1960	5,969	18,887	24,856	
1961	18,918	28,934	47,852	
1962	15,341	13,582	28,923	
1963	12,016	34,482	46,498	
1964	17,149	29,017	46,166	
1965	21,989	24,697	46,686	
1966	25,545	49,325	74,870	
1967	29,986	59,913	89,899	
1968	34,278	32,942	67,220	
1969	43,997	40,617	84,614	55,758
1970	39,290	69,612	108,902	64,163
1971	40,274	43,242	83,516	67,729
1972	39,454	40,396	79,850	72,822
1973	32,838	39,093	71,931	75,365
1974	18,664	27,139	45,803	75,329
1975	21,720	48,448	70,168	77,677
1976	30,735	58,606	89,341	79,124
1977	35,830	56,580	92,410	79,376
1978	45,641	36,270	81,911	80,845
1979	38,966	56,283	95,249	81,908
1980	35,881	59,892	95,773	80,595
1981	47,663	61,329	108,992	83,143
1982	48,234	58,018	106,252	85,783
1983	33,174	47,412	80,586	86,649
1984	31,742	56,930	88,672	90,935
1985	37,889	43,874	81,763	92,095
1986	19,414	51,019	70,433	90,204
1987	36,179	67,325	103,504	91,314
1988	55,716	70,943 <sup>c</sup>	126,659	95,788
1989	43,217	82,098	125,315	98,795
1990	53,504	85,499	139,003	103,118
1991	37,778	85,627	123,405	104,559
1992	46,872	64,702	111,574	105,091
1993	8,735	89,290	98,025	106,835
1994	16,211	95,411	111,622	109,130
1995	30,846	97,193	128,039	113,758
1996	7,421	78,729	86,150	115,330
1997	10,441	Unavailable		
10-Year Average				
(1987-1996)	33,648	81,682	115,330	

<sup>a</sup> Districts 1 and 2; also includes harvests in District 3 from 1960 to 1965.<sup>b</sup> Estimated subsistence harvest expanded from villages surveyed.<sup>c</sup> Beginning in 1988, estimates are based on a new formula so data since 1988 is not comparable with previous years.

Table 4. Historical commercial salmon harvest in the Kuskokwim River, Districts 1 and 2 combined, 1960 - 1997 <sup>a</sup>.

Year	Chinook	Sockeye	Chum	Pink	Coho	Total
1960	5,969	0	0	0	2,498	8,467
1961	18,918	0	0	0	5,044	23,962
1962	15,341	0	0	0	12,432	27,773
1963	12,016	0	0	0	15,660	27,676
1964	17,149	0	0	0	28,613	45,762
1965	21,989	0	0	0	12,191	34,180
1966	25,545	0	0	0	22,985	48,530
1967	29,986	0	148	0	56,313	86,447
1968	34,278	0	187	0	127,306	161,771
1969	43,997	322	7,165	0	83,765	135,249
1970	39,290	117	1,664	44	38,601	79,716
1971	40,274	2,606	68,914	0	5,253	117,047
1972	39,454	102	78,619	8	22,579	140,762
1973	32,838	369	148,746	33	130,876	312,862
1974	18,664	136	171,887	84	147,269	338,040
1975	21,720	23	181,840	10	81,945	285,538
1976	30,735	2,971	177,864	133	88,501	300,204
1977	35,830	9,379	248,721	203	241,364	535,497
1978	45,641	733	248,656	5,832	213,393	514,255
1979	38,966	1,054	261,874	78	219,060	521,032
1980	35,881	360	483,211	803	222,012	742,267
1981	47,663	48,375	418,677	292	211,251	726,258
1982	48,234	33,154	278,306	1,748	447,117	808,559
1983	33,174	68,855	267,698	211	196,287	566,225
1984	31,742	48,575	423,718	2,942	623,447	1,130,424
1985	37,889	106,647	199,478	75	335,606	679,695
1986	19,414	95,433	309,213	3,422	659,988	1,087,470
1987	36,179	136,602	574,336	43	399,467	1,146,627
1988	55,716	92,025	1,381,674	10,825	524,296	2,064,536
1989	43,217	42,747	749,182	464	479,856	1,315,466
1990	53,504	84,870	461,624	3,397	410,332	1,013,727
1991	37,778	108,946	431,802	378	500,935	1,079,839
1992	46,872	92,218	344,603	7,451	666,170	1,157,314
1993	8,735	27,008	43,337	64	610,739	689,883
1994	16,211	49,365	271,115	30,949	724,689	1,092,329
1995	30,846	92,500	605,918	93	471,461	1,200,818
1996	7,421	33,878	207,877	1,621	937,299	1,188,096
1997	10,441	21,989	17,026	2	130,803	180,261
10-Year Average (1987-1996)	33,648	76,016	507,147	208 <sup>b</sup>	572,524	1,194,864

<sup>a</sup> Includes harvests in District 3 from 1960 to 1965.

<sup>b</sup> Odd years only.

Table 5. Utilization of Kuskokwim River chum salmon, 1960-1997.

Year	Commercial Harvest <sup>a</sup>	Subsistence Harvest <sup>b</sup>	Total Utilization	Running 10-Year Average
1960	0	301,753 <sup>c</sup>	301,753	
1961	0	179,529 <sup>c</sup>	179,529	
1962	0	161,849 <sup>c</sup>	161,849	
1963	0	137,649 <sup>c</sup>	137,649	
1964	0	190,191 <sup>c</sup>	190,191	
1965	0	250,878 <sup>c</sup>	250,878	
1966	0	175,735 <sup>c</sup>	175,735	
1967	148	208,445 <sup>c</sup>	208,593	
1968	187	275,008 <sup>c</sup>	275,195	
1969	7,165	204,105 <sup>c</sup>	211,270	209,264
1970	1,664	246,810 <sup>c</sup>	248,474	203,936
1971	68,914	116,391 <sup>c</sup>	185,305	204,514
1972	78,619	120,316 <sup>c</sup>	198,935	208,223
1973	148,746	179,259 <sup>c</sup>	328,005	227,258
1974	171,887	277,170 <sup>c</sup>	449,057	253,145
1975	181,840	176,389 <sup>c</sup>	358,229	263,880
1976	177,864	223,792 <sup>c</sup>	401,656	286,472
1977	248,721	198,355 <sup>c</sup>	447,076	310,320
1978	248,658	118,809 <sup>c</sup>	367,467	319,547
1979	261,874	161,239 <sup>c</sup>	423,113	340,732
1980	483,211	165,172 <sup>c</sup>	648,383	380,723
1981	418,677	157,306 <sup>c</sup>	575,983	419,790
1982	278,306	190,011 <sup>c</sup>	468,317	446,729
1983	267,698	146,876 <sup>c</sup>	414,574	455,386
1984	423,718	142,542 <sup>c</sup>	566,260	467,106
1985	199,478	94,750	294,228	460,706
1986	309,213	141,931 <sup>c</sup>	451,144	465,655
1987	574,336	70,709	645,045	485,451
1988	1,381,674	151,967 <sup>d</sup>	1,533,641	602,069
1989	749,182	140,345	889,527	648,710
1990	461,624	125,626	587,250	642,597
1991	431,802	92,961	524,763	637,475
1992	344,603	96,081	440,684	634,712
1993	43,337	59,259	102,596	603,514
1994	271,115	72,268	343,383	581,226
1995	605,918	68,263	674,181	619,221
1996	207,877	89,430	294,307	603,833
1997	17,026	Not Available		
10-Year Average (1987-1996)	507,147	96,691	603,584	

<sup>a</sup> District 1 and 2<sup>b</sup> Estimated subsistence harvest expanded from villages surveyed.<sup>c</sup> Includes small numbers of small chinook, sockeye and coho salmon<sup>d</sup> Beginning in 1988, estimates are based on a new formula so data since 1988 is not comparable with previous years.

Table 6. Historical commercial salmon harvest and number of permit holders that fished for District 4, 1960-1997.

Year	Permits <sup>a</sup>	Chinook	Sockeye	Chum	Pink	Coho	Total
1960		0	5,649	0	0	3,000	8,649
1961		4,328	2,308	18,864	90	46	25,636
1962		5,526	10,313	45,707	4,340	0	65,886
1963		6,555	0	0	0	0	6,555
1964		4,081	13,422	707	939	379	19,528
1965		2,976	1,886	4,242	0	0	9,104
1966		278	1,030	2,610	268	0	4,186
1967		0	652	8,087	0	1926	10,665
1968		8,879	5,884	19,497	75,818	21,511	131,589
1969		16,802	3,784	38,206	953	15,077	74,822
1970	88	18,269	5,393	46,556	15,195	16,850	102,263
1971	61	4,185	3,118	30,208	13	2,982	40,506
1972	107	15,880	3,286	17,247	1,878	376	38,667
1973	109	14,993	2,783	19,680	277	16,515	54,248
1974	196	8,704	19,510	15,298	43,642	10,979	98,133
1975	127	3,928	8,584	35,233	486	10,742	58,973
1976	181	14,110	6,090	43,659	31,412	13,777	109,048
1977	258	19,090	5,519	43,707	202	9,028	77,546
1978	200	12,335	7,589	24,798	47,033	20,114	111,869
1979	206	11,144	18,828	25,995	295	47,525	103,787
1980	169	10,387	13,221	65,984	21,671	62,610	173,873
1981	186	24,524	17,292	53,334	160	47,551	142,861
1982	117	22,106	25,685	34,346	11,838	73,652	167,627
1983	226	46,385	10,263	23,090	168	32,442	112,348
1984	263	33,663	17,255	50,422	16,249	132,151	249,740
1985	300	30,401	7,876	20,418	28	29,992	88,715
1986	324	22,835	21,484	29,700	8,700	57,544	140,263
1987	310	26,022	6,489	8,557	66	50,070	91,204
1988	288	13,883	21,556	29,220	21,258	68,605	154,574
1989	227	20,820	20,582	39,395	273	44,607	125,677
1990	390	27,644	83,681	47,717	12,056	26,926	198,024
1991	346	9,480	53,657	54,493	115	42,571	160,316
1992	349	17,197	60,929	73,383	64,217	86,404	302,130
1993	409	15,784	80,934	40,943	7	55,817	193,485
1994	308	8,564	72,314	61,301	35,904	83,912	261,995
1995	382	38,584	68,194	81,462	186	66,203	254,629
1996	218	14,165	57,665	83,005 <sup>b</sup>	20	118,718	273,573
1997	289	35,510	69,562	38,445	5	32,862	176,384
10-Year Average (1987-1996)	323	19,214	52,600	51,948	129 <sup>c</sup>	64,383	201,561

<sup>a</sup> Number of permit holders that fished at least once during the season. Information not available prior to 1970.

<sup>b</sup> Includes an estimated number of chum caught for roe-only sales.

<sup>c</sup> Odd years only.

Table 7. District 5, commercial salmon harvest, 1968 - 1997 and total number of permit holders that fished 1970 - 1997.

Year	Permits <sup>a</sup>	Chinook	Sockeye	Chum	Pink	Coho	Total
1968						5,458	5,458
1969		3,978	6,256	5,006	298	11,631	27,169
1970	35	7,163	7,144	12,346	12,183	6,794	45,630
1971	16	477	330	301	0	1,771	2,879
1972	14	264	924	1,331	66	925	3,510
1973	21	3,543	2,072	15,781	324	5,017	26,737
1974	49	3,302	9,357	8,942	16,373	21,340	59,314
1975	50	2,156	9,098	5,904	419	17,889	35,466
1976	40	4,417	5,575	10,354	8,453	9,852	38,651
1977	34	3,336	3,723	6,531	29	13,335	26,954
1978	35	5,218	5,412	8,590	9,103	13,764	42,087
1979	30	3,204	19,581	9,298	201	42,098	74,382
1980	48	2,331	28,632	11,748	7,832	43,256	93,799
1981	48	7,190	40,273	13,642	11	19,749	80,865
1982	48	9,476	38,877	13,829	4,673	46,683	113,538
1983	79	14,117	11,716	6,766	0	19,660	52,259
1984	77	8,612	15,474	14,340	4,711	71,176	114,313
1985	69	5,793	6,698	4,784	8	16,498	33,781
1986	86	2,723	25,112	10,355	4,447	19,378	62,015
1987	69	3,357	27,758	20,381	54	29,057	80,607
1988	125	4,964	36,368	33,059	5,509	30,832	110,732
1989	88	2,966	19,299	13,622	82	31,849	67,818
1990	82	3,303	35,823	13,194	629	7,804	60,753
1991	72	912	39,838	15,892	29	13,312	69,983
1992	111	3,528	39,194	18,520	14,310	19,875	95,427
1993	114	2,117	59,293	10,657	0	20,014	92,081
1994	116	2,570	69,490	28,477	18,017	47,499	166,053
1995	118	2,922	37,351	19,832	39	17,875	78,019
1996	53	1,375	30,717	11,093	70	43,836	87,091
1997	54	2,039	31,451	11,729	0	2,983	48,202
10-Year Average (1987-1996)	95	2,801	39,513	18,473	41 <sup>b</sup>	26,195	90,856

<sup>a</sup> Number of permit holders that fished at least once during the season.

<sup>b</sup> Odd years only.

Table 8. Salmon fishery projects operated in the Kuskokwim Area during 1997.

Project Name	Location	Primary Objectives	Duration	Agency	Responsibility
Salmon Management Plan	Kuskokwim Area	- develop a comprehensive plan for managing salmon stocks of the Kuskokwim Area. - define goals and objectives. - identify potential opportunities and concerns. - recommend appropriate procedures. - evaluate priorities.	June - Sept.	ADFG/CFMD	all aspects
Subsistence Catch and Effort Assessment	Kuskokwim Area	- document and estimate the catch and associated effort of the subsistence salmon fisheries via interviews, catch calendars, mail-out questionnaires and telephone interviews.	Post-season	ADFG/S	all aspects
Escapement Sampling	Kuskokwim Area	- estimate age, sex and length of chinook, sockeye, chum and coho salmon from selected tributary spawning populations.	June - Sept	ADFG/CFMD	all aspects
Aerial Surveys	Kuskokwim Area	- index relative abundance of chinook salmon spawning escapement in selected streams throughout the Kuskokwim Area. - index relative abundance of sockeye salmon spawning escapement in the Kanektok and Goodnews Rivers.	July - Aug	ADFG/CFMD	all aspects
Sport Catch, Harvest and Effort Assessment	Kuskokwim Area	- statewide mail-out survey to estimate sport catch, harvest and effort	post-season	ADFG/SF	all aspects
Commercial Catch and Effort Assessment	Districts 1, 2, 4 and 5	- document and estimate the catch and associated effort of the commercial salmon fishery via receipts (fish tickets) of commercial sales and dock side sampling.	June - Sept	ADFG/CFMD	all aspects
Commercial Catch Sampling	Districts 1, 4 and 5	- determine age, sex, and length of salmon harvested in the commercial fisheries.	June - Sept	ADFG/CFMD	all aspects
Bethel Test Fishery	Bethel Area RM. 80	- index relative run timing of chinook, sockeye, chum and coho salmon using drift gillnets. - index relative run abundance of chinook, sockeye, chum and coho salmon using CPUE derived from drift gillnet catches.	June - Aug	ADFG/CFMD	all aspects
Kwethluk River Counting Tower	mile Kwethluk River RM. 99	- estimate daily escapement of chinook, sockeye, chum and pink salmon into the Kwethluk River. - estimate age, sex and length composition of chinook and chum salmon escapement.	June - July	AVCP	all aspects
				ADFG/CFMD	planning, supplies & crew support
				USFWS	planning & supplies
				BSFA	funding

- continued -

Table 8. (page 2 of 2)

Project Name	Location	Primary Objectives	Duration	Agency	Responsibility
Aniak River Sonar	mile 12 Aniak River RM. 225	- estimate daily escapement of salmon into the Aniak River. - estimate age, sex and length composition of chum salmon escapement	June - July	ADFG/CFMD	all aspects
				AVCP	crew support
George River Weir	mile 4 George River RM. 309	- estimate daily escapement of chinook, sockeye, chum and pink salmon into the George River. - estimate age, sex and length composition of chinook and chum salmon escapement.	June - July	KNA	all aspects
				ADFG/CFMD	all aspects crew leader
				BSFA	funding
Kogruklu River Weir	mile 85 Holitna River Drainage RM. 335	- estimate daily escapement of chinook, sockeye, chum and coho salmon into the Kogruklu River. - estimate age, sex and length composition of chinook, chum and coho salmon escapement	June - Sept	ADFG/CFMD	all aspects
Takotna River Counting Tower	mile 35 Takotna River RM. 507	- estimate daily escapement of chinook and chum salmon into the Takotna River.	June - July	TCSTC	all aspects
				ADFG/CFMD	planning & supplies
				BSFA	funding
Kanektok River Counting Tower	mile ~7 Kanektok River Kuskokwim Bay	- estimate daily escapement of chinook, sockeye, chum pink and coho salmon into the Kanektok River. - estimate age, sex and length composition of chinook sockeye, chum, and coho salmon escapement.	June - July	QIRA	all aspects
				ADFG/CFMD	planning, supplies & crew leader
				USFWS	planning & supplies
				BSFA	funding
Middle Fork Goodnews River Weir	mile 18 Middle Fork Goodnews River Kuskokwim Bay	- estimate daily escapement of chinook, sockeye, chum, pink and coho salmon into the Middle Fork Goodnews River. - estimate age, sex and length composition of chinook, sockeye, chum and coho salmon escapement	June - Aug	ADFG/CFMD	all aspects
				USFWS BSFA	floating weir support

## Agency Acronyms:

ADFG/CFMD	= Commercial Fisheries Management and Development Division; Alaska Department of Fish and Game
ADFG/S	= Subsistence Division; Alaska Department of Fish and Game
ADFG/SF	= Sport Fish Division; Alaska Department of Fish and Game
AVCP	= Association of Village Council Presidents
BSFA	= Bering Sea Fishermen's Association
KNA	= Kuskokwim Native Association
QIRA	= Quinhagak IRA
TCSTC	= Takotna Community School and Training Center
USFWS	= U.S. Fish and Wildlife Service

Table 9. Peak aerial survey counts of chinook salmon in indexed Kuskokwim River spawning tributaries, 1975 - 1997<sup>a</sup>.

Year	Lower Kuskokwim				Middle Kuskokwim						Upper Kuskokwim		
	Kwethluk Eek	Canyon C.	Kisaralik	Tuluksak	Aniak	Kipchuk (Aniak)	Salmon (Aniak)	Holokuk	Oskawalik	Holitna	Kogruklu Weir	Cheeneetnuk	Salmon (Pitka)
1975			118			94		17	71	1,114			
1976				139		177		126	204	2,571	5,579	1,197	1,146
1977		2,290		291			562	60	276			1,399	1,978
1978	1,613	1,732	2,417	403			289			2,766	13,667	267	1,127
1979		911						113			11,338		699
1980	2,378			725			1,186	250	123				1,177
1981		1,783	672		9,074		894				16,655		1,474
1982	230				2,645		185	42	120	521	10,993		419
1983	188	471	731	129	1,909		231	33	52	1,069		243	586
1984		273	157	93	1,409					299	4,926	1,177	577
1985	1,118	629		135				135	61		4,619	1,002	625
1986					909		336	100		850	5,038	381	
1987	1,739	975		60		193	516	208	193	813		317	
1988	2,255	766	840	188	945		244	57	80		8,506		501
1989	1,042	1,157	152		1,880	994	631				11,940		446
1990	1,983	1,295	631	166	1,255	537	596	143	113		10,218		
1991	1,312	1,002		342	1,564	885	583				7,850		
1992					2,284	670	335	64	91	1,822	6,755	1,050	2,555
1993					2,687	1,248	1,082	114	103	1,573	12,332	678	1,012
1994		848	1,021		1,848	1,520	1,218				15,227	1,206	1,010
1995			1,243		3,174	1,215	1,442	181	289	2,787	20,630	1,565	1,911
1996					3,496		983	85			14,199		
1997			439	173	2,187	855	980	165	1,470	2,093	13,280	345	
BEG	1,460 <sup>b</sup>	1,200 <sup>c</sup>	1,000 <sup>c</sup>	400 <sup>c</sup>	1,500 <sup>c</sup>	670 <sup>b</sup>	600 <sup>c</sup>	107 <sup>b</sup>	108 <sup>b</sup>	2,000 <sup>c</sup>	10,000 <sup>c</sup>	1,002 <sup>b</sup>	1,300 <sup>c</sup>

<sup>a</sup> Estimates are from "peak" aerial surveys conducted between 20 and 31 July under fair, good, or excellent viewing conditions.

<sup>b</sup> Median of years 1975 through 1994.

<sup>c</sup> Formally established BEG (Buklis 1993).



Table 10. Historical salmon escapement data from selected Kuskokwim Area projects, 1976-1997.

Year	Operating Period	Chinook	Sockeye	Chum	Pink	Coho
<b>Kogrukluuk River Weir</b>						
<b>BEG</b>		<b>10,000</b>		<b>30,000</b>		<b>25,000</b>
1976	06/29 to 07/31	5,579	2,326	8,117	0	<sup>b</sup>
1977	07/14 to 07/27	1,945 <sup>b</sup>	1,637 <sup>b</sup>	19,444	2	<sup>b</sup>
1978	06/28 to 07/31	13,667	1,670	48,125	2	<sup>b</sup>
1979	07/01 to 07/24	11,338	2,628	18,599	1	<sup>b</sup>
1980	07/01 to 07/11	6,572 <sup>b</sup>	3,200 <sup>b</sup>	41,777	1	<sup>b</sup>
1981	06/27 to 10/25	16,655	18,066	57,365	6	11,455
1982	07/09 to 09/14	10,993	17,297	64,077	19	37,796
1983	06/22 to 07/02	2,992 <sup>b</sup>	1,176 <sup>b</sup>	9,407 <sup>b</sup>	0	8,538
1984	06/19 to 09/15	4,928	4,133	41,484	0	27,59
1985	06/29 to 09/07	4,619	4,359	15,005	0	16,441
1986	07/06 to 10/05	5,038	4,224	14,693	0	22,506
1987	08/09 to 09/23	4,063 <sup>b</sup>	<sup>b</sup>	17,422 <sup>b</sup>	0	22,821
1988	07/05 to 09/17	8,505	4,397	39,540	0	13,512
1989	07/07 to 09/14	11,940 <sup>b</sup>	5,811 <sup>b</sup>	39,548	0	<sup>b</sup>
1990	06/28 to 09/07	10,218	8,406	26,765	1	6,132 <sup>b</sup>
1991	07/04 to 09/15	7,850	16,455	24,188	4	9,933
1992	07/01 to 08/21	6,755	7,540	34,105	11	26,057 <sup>b</sup>
1993	07/02 to 09/06	12,332	29,358	31,899	0	20,517 <sup>b</sup>
1994	07/02 to 09/10	15,227	14,192 <sup>b</sup>	46,192 <sup>b</sup>	23	34,695
1995	07/02 to 09/06	20,630	10,996	31,265	2	27,856
1996	06/29 to 09/15	14,199	15,381	48,494	6	50,555
1997	06/28 to 09/21	13,285	13,062	7,937	0	12,312
<b>Aniak River Sonar</b>						
<i>Non user-configurable, one-bank expanded estimates 1980 - 1995</i>						
<b>BEG</b>				<b>250,000</b>		
1980	06/22 to 07/30	56,469		1,169,470		
	08/16 to 09/12					81,556
1981	06/16 to 08/06	42,060		589,286		
1982	06/21 to 08/01	33,864		442,461		
1983	06/18 to 7/28	4,911		129,367		
1984	06/16 to 07/30			266,976 <sup>c</sup>		
1985	06/22 to 07/28			253,051		
1986	06/26 to 07/24			209,080		
1987	06/22 to 07/31			193,013		
1988	06/22 to 07/31			401,511		
1989	06/21 to 07/24			243,922		
1990	06/23 to 08/06			232,260		
1991	06/29 to 07/29			314,166		
1992	06/22 to 07/29			84,269		
1993	06/24 to 07/28			13,870		
1994	06/28 to 07/28			388,163		
1995	06/23 to 07/23			<sup>d</sup>		
<i>User-configurable, two-bank estimates, 1996 - 1997</i>						
<b>BEG</b>				<b>250,000<sup>e</sup></b>		
1996	06/21 to 07/28			302,106		
1997	06/16 to 08/03			262,522		

- continued -

Table 10. (page 2 of 2)

Year	Operating Period	Chinook	Sockeye	Chum	Pink	Coho	Unknown
<u>Kwethluk River</u>							
<i>Weir</i>							
1992	06/18 to 09/12	9,675	1,316	30,596	45,952	45,605	
<i>Tower</i>							
1996	06/22 to 07/27	7,859	2,075	27,462	2,899 <sup>b</sup>	180 <sup>b</sup>	
1997	06/22 to 08/12	10,505	1,400	10,780	1,009 <sup>b</sup>	1,110 <sup>b</sup>	
<u>Tuluksak River Weir</u>							
1991	06/12 to 09/18	697	34	7,675	391	4,651	
1992	06/24 to 09/10	1,083	129	11,183	2,458	7,501	
1993	06/17 to 09/10	2,218	88	13,804	210	8,328	
1994	06/29 to 09/11	2,922	94	15,707	3,450	8,213	
<u>George River Weir</u>							
1996	06/21 to 07/26	7,487	98	17,570	644 <sup>b</sup>	173 <sup>b</sup>	
1997	06/09 to 09/15	7,820	445	5,940	0	8,937	
<u>Takotna River Tower</u>							
1995	07/07 to 07/31	<sup>b</sup>	0	1,685 <sup>b</sup>	0	0 <sup>b</sup>	
1996	06/15 to 07/26	402	0	2,806	0	0 <sup>b</sup>	
1997	06/15 to 07/26	1,167	0	1,785			
<u>Middle Fork Goodnews River Tower/Weir</u>							
<b>BEG</b>		<b>3,500</b>	<b>25,000</b>	<b>15,000</b>			
<i>Counting Tower, 1981 - 1991</i>							
1981	06/13 to 08/15	3,688	49,108	21,827	1,327 <sup>b</sup>	356 <sup>b</sup>	
1982	06/23 to 08/03	1,395	56,255	6,767	13,855 <sup>b</sup>	91 <sup>b</sup>	
1983	06/11 to 07/28	6,022	25,813	15,548	34 <sup>b</sup>	0 <sup>b</sup>	
1984	06/15 to 07/31	3,260	32,053	19,003	13,744 <sup>b</sup>	249 <sup>b</sup>	
1985	06/27 to 07/31	2,831	24,131	10,367	144 <sup>b</sup>	282 <sup>b</sup>	
1986	06/16 to 07/24	2,092	51,069	14,764	8,133 <sup>b</sup>	163 <sup>b</sup>	
1987	06/22 to 07/30	2,272	28,871	17,517	62 <sup>b</sup>	62 <sup>b</sup>	
1988	06/23 to 07/30	2,712	15,799	20,799	6,781 <sup>b</sup>	6 <sup>b</sup>	
1989	06/29 to 07/31	1,915	21,186	10,380	246 <sup>b</sup>	1,212 <sup>b</sup>	
1990	06/19 to 07/24	3,636	31,679	6,410	3,378 <sup>b</sup>	0 <sup>b</sup>	
<i>Weir, 1991 - 1997</i>							
1991	06/29 to 08/24	1,952	47,397	27,525	1,694 <sup>b</sup>	1,978 <sup>b</sup>	
1992	06/29 to 08/25	1,903	27,268	22,023	23,030 <sup>b</sup>	150 <sup>b</sup>	
1993	06/22 to 08/18	2,317	26,044	14,472	253 <sup>b</sup>	1,374 <sup>b</sup>	
1994	06/23 to 08/08	3,856	55,751	34,849	38,705 <sup>b</sup>	309 <sup>b</sup>	
1995	06/19 to 08/28	4,836	39,009	33,699	330 <sup>b</sup>	5,415 <sup>b</sup>	
1996	06/19 to 08/23	2,930	58,264	40,450	14,509 <sup>b</sup>	9,699 <sup>b</sup>	
1997	06/11 to 09/17	2,937	35,530	17,296	940	9,619	
<u>Kanektok River Tower</u>							
1996	07/2-7/13; 7/20 -7/25	6,827 <sup>b</sup>	71,637 <sup>b</sup>	70,617 <sup>b</sup>			
1997	06/11 to 8/21	16,731	96,348	51,180	7,872 <sup>b</sup>	23,172 <sup>b</sup>	5,232

<sup>a</sup> Pink salmon can pass freely through the Kogruluk River weir.

<sup>b</sup> No counts or incomplete count as project was not operated during a significant portion of the species' migration.

<sup>c</sup> Aniak River sonar counts after 1983 represent multiple species, however, chum salmon are assumed to be the dominate species during the operational period.

<sup>d</sup> Reliable escapement estimates are not available from Aniak River sonar for 1995.

<sup>e</sup> The original Aniak River sonar BEG of 250,000 fish counts has been carried forward to the user configurable project, but the BEG will be reassessed as more information is gathered.

Table 11. Estimated exvessel value of the Kuskokwim Area commercial salmon fishery, 1964 - 1997.

Year	Exvessel Value	Permits Fished <sup>a</sup>	Average Income
1964	83,030		
1965	90,950		
1966	87,466		
1967	138,647		
1968	290,370		
1969	297,233		
1970	362,470		
1971	371,220		
1972	360,727		
1973	827,735		
1974	1,056,042		
1975	899,178		
1976	1,380,229		
1977	3,891,950		
1978	2,337,470		
1979	3,678,000		
1980	2,725,134		
1981	3,766,525		
1982	4,213,954		
1983	2,670,400		
1984	5,809,000	744	7,508
1985	3,248,089	781	4,159
1986	4,746,089	789	6,015
1987	6,392,822	798	8,011
1988	12,514,492	811	15,431
1989	5,194,025	824	6,303
1990	4,865,070	824	5,904
1991	3,961,423	820	4,831
1992	5,295,912	814	6,506
1993	3,962,890	807	4,911
1994	5,201,611	797	6,526
1995	4,209,752	829	5,078
1996	2,900,613	713	4,068
1997	1,058,808	702	1,508
10-Year Average (1987-1996)	5,449,861	804	6,757

<sup>a</sup> Number of permits that made at least one delivery. Data not available for years prior to 1984.

Table 12. Harvest and exvessel value of Kuskokwim Area salmon by district, 1997.

	Chinook	Sockeye	Chum	Pink	Coho	Total
<u>Lower Kuskokwim River, District W-1</u>						
Fish	10,436	21,988	17,003	2	129,601	179,030
Pounds	141,705	158,346	121,933	6	947,786	1,369,776
Price	0.26	0.41	0.16	0.10	0.33	
Value	\$36,843	\$64,922	\$19,509	\$1	\$312,769	\$434,044
	<u>Ave. 1988-96</u>					
Fish	32,123	67,666	484,383	6,111	571,981	1,162,264
Value	\$335,894	\$427,511	\$967,172	\$2,078	\$2,167,491	\$3,900,147
<u>Middle Kuskokwim River, District W-2</u>						
Fish	5	1	23	0	1,202	1,231
Pounds	129	8	132	0	8,232	8,501
Price	0.35	0.50	0.10		0.35	
Value	\$45	\$4	\$13	\$0	\$2,881	\$2,944
	<u>Ave. 1988-96</u>					
Fish	1,272	1,614	15,187	27	19,777	37,877
Value	\$14,356	\$10,009	\$25,630	\$15	\$72,805	\$122,814
<u>Quinhagak, District W-4</u>						
Fish	35,510	69,562	38,445	5	32,862	176,384
Pounds	603,707	492,240	279,762	13	271,752	1,647,504
Price	0.28	0.42	0.11	0.10	0.34	
Value	\$169,038	\$206,741	\$30,777	\$1	\$92,396	\$498,953
	<u>Ave. 1988-96</u>					
Fish	18,457	57,721	56,765	14,893	65,972	213,807
Value	\$199,050	\$300,126	\$94,761	\$4,594	\$285,975	\$884,507
<u>Goodnews Bay, District W-5</u>						
Fish	2,039	31,451	11,729	0	2,983	48,202
Pounds	31,962	221,775	85,069	0	27,931	366,737
Price	0.34	0.42	0.11		0.34	
Value	\$10,867	\$93,146	\$9,358	\$0	\$9,497	\$122,867
	<u>Ave. 1988-96</u>					
Fish	2,740	40,819	18,261	4,293	25,876	91,988
Value	\$33,104	\$237,952	\$36,568	\$1,258	\$130,664	\$439,545
<u>Kuskokwim Area Total</u>						
Fish	47,990	123,002	67,200	7	166,648	404,847
Pounds	777,503	872,369	486,926	19	1,255,701	3,392,518
Price	0.28	0.42	0.12	0.10	0.33	
Value	\$216,793	\$364,812	\$59,657	\$2	\$417,543	\$1,058,808
	<u>Ave. 1988-96</u>					
Fish	54,591	167,820	574,595	25,324	683,606	1,505,937
Value	\$582,405	\$975,598	\$1,124,131	\$7,944	\$2,656,935	\$5,347,013

Table 13. Mean salmon weights and prices paid to commercial permit holders in the Kuskokwim Area, 1967 - 1997.

Year	Average Weight (lb)					Average Price (\$)				
	Chinook	Sockeye	Chum	Pink	Coho	Chinook	Sockeye	Chum	Pink	Coho
1967	27.8	7.4	7.0	<sup>a</sup>	5.9	0.13	0.05	0.04	<sup>a</sup>	0.09
1968	23.8	6.2	7.9	4.0	7.2	0.16	0.10	0.04	0.05	0.09
1969	19.6	6.2	5.8	3.6	7.3	0.19	0.15	0.07	0.06	0.10
1970	18.9	5.4	6.1	3.3	7.3	0.20	0.21	0.08	0.08	0.14
1971 <sup>b</sup>	26.2	6.9	6.4	<sup>a</sup>	6.1	0.17	0.10	0.08	<sup>a</sup>	0.13
1972	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	0.20	<sup>a</sup>	0.08	<sup>a</sup>	0.16
1973	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	0.25	<sup>a</sup>	0.19	<sup>a</sup>	0.26
1974	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	0.46	0.34	0.25	0.23	0.27
1975	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	0.54	<sup>a</sup>	0.26	<sup>a</sup>	0.31
1976 <sup>c</sup>	17.0	6.7	7.0	3.5	7.8	0.64	0.43	0.27	0.25	0.40
1977	22.7	8.3	7.3	3.9	7.8	1.15	0.45	0.45	0.25	0.65
1978	24.2	6.5	8.9	3.9	7.1	0.50	0.49	0.32	0.12	0.40
1979	16.6	6.9	7.0	3.9	7.9	0.66	0.53	0.37	0.11	0.75
1980	14.1	6.7	6.4	3.6	6.9	0.47	0.31	0.24	0.12	0.64
1981	17.8	7.2	7.5	3.5	6.4	0.84	0.61	0.23	0.11	0.63
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.22	0.05	0.53
1983	18.8	6.8	7.4	3.5	6.8	0.54	0.51	0.33	0.05	0.39
1984	16.4	6.6	6.7	3.2	7.7	0.89	0.52	0.28	0.07	0.55
1985	17.0	7.0	7.1	3.6	7.5	0.71	0.59	0.25	0.05	0.51
1986	17.0	7.2	6.8	3.4	6.4	0.80	0.70	0.25	0.05	0.60
1987	15.2	7.5	6.8	3.7	7.2	1.10	1.30	0.27	0.10	0.73
1988	15.1	7.3	8.1	3.4	7.5	1.30	1.42	0.40	0.15	1.25
1989	16.6	7.2	6.8	3.4	7.3	0.75	1.20	0.26	0.05	0.55
1990	15.1	6.7	6.9	3.2	6.5	0.56	1.05	0.26	0.12	0.75
1991	15.3	6.9	6.3	3.4	6.5	0.56	0.67	0.31	0.12	0.45
1992	13.4	7.0	6.8	3.9	7.3	0.66	0.90	0.32	0.06	0.45
1993	14.3	7.1	6.5	3.4	6.6	0.62	0.70	0.40	0.25	0.58
1994	15.6	6.9	6.6	3.6	7.6	0.51	0.53	0.21	0.08	0.57
1995	17.3	6.9	6.9	3.7	7.2	0.60	0.71	0.18	0.12	0.41
1996	15.7	7.2	7.2	3.8	8.0	0.26	0.40	0.11	0.12	0.25
1997	16.2	7.1	7.3	2.7	7.5	0.28	0.42	0.12	0.10	0.33
10-Year										
Average	15.4	7.1	6.9	3.6	7.2	0.69	0.89	0.27	0.12	0.60
(1987 - 96)										

<sup>a</sup> Information unavailable.

<sup>b</sup> Information was not available for District 5.

<sup>c</sup> Information was not available for District 4.

Table 14. Executive summary of Working Group and department actions, 1997.

Date	Comment
28 April	The Working Group accepted the resignations of Joe Lomack, of the Kuskokwim Fishermen's Coop, and Joe Chief Sr., Elder representative. Greg Hoffman Sr. was appointed to fill the Kuskokwim Fishermen's Coop seat and Andrew Fredricks, Sleetmute, was appointed to be the Elder representative. Greg Hoffman Sr and Henry Hunter (Orutsararmuit Native Council) were elected Co-Chairs of the Working Group for the 1997 season. A request for voting membership from ONC was rejected. A committee was appointed to review and revise the Working Group By-Laws. Other topics discussed were the 1997 AYK Board of Fisheries meeting, 1997 Kuskokwim River Salmon Management Plan, AYK sonar program rebuilding plan and proposed cuts to the ADF&G budget.
13 June	The king and chum salmon runs appear to be below average in size with relatively low subsistence catches. John Nicori Jr. was appointed the Lower Kuskokwim River Subsistence representative. Orutsararmuit Native Council's resignation from the Working Group was accepted. Henry Hill, Upriver Commercial Fishermen's representative was elected to replace Henry Hunter (ONC) as a Co-Chair. After review, the revised Working Group By-Laws were sent back to committee for further revision. <u>Dept. recommendation:</u> Working Group to meet again on 16 June to reevaluate the salmon runs. <u>Actual outcome:</u> Working Group met again on 16 June.
16 June	The king and chum salmon runs continue to appear below average for this time period. The Working Group approved Pete Mellick, from Sleetmute, to serve as alternate for the sport-fish representative. <u>Dept. recommendation:</u> Working Group to meet again on June 18 to reevaluate the salmon runs. <u>Working Group recommendation:</u> The department to continue evaluating the salmon run and determine the date of the first commercial opening. <u>Actual outcome:</u> Six hour period in District W-1, below Bethel, on 23 June.
25 June	Record low chum salmon harvest during the 23 June commercial period. <u>Dept. recommendation:</u> Commercial fishing on the Kuskokwim River be suspended until indicators of chum salmon run strength increase enough to allow consideration of a fishing period. <u>Working Group recommendation:</u> The department to continue evaluating the salmon run with the next Working Group meeting to be at the call of the chair. <u>Actual outcome:</u> The Working Group met again on 10 July.
10 July	The Kuskokwim River commercial and sport fisheries for chum salmon were closed due to an extremely weak return of chum salmon. <u>Dept. recommendation:</u> The Working Group discuss the need and possible means to reduce the harvest of chum salmon in the subsistence fishery. <u>Working Group recommendation:</u> Collect public input through personal contacts and a radio call-in show before recommending any actions effecting the subsistence fishery. <u>Actual outcome:</u> The Working Group met again on 14 July.

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Table 14. (page 2 of 4)

Date	Comment
10 July	<p>The Kuskokwim River commercial and sport fisheries for chum salmon were closed due to an extremely weak return of chum salmon.</p> <p><u>Dept. recommendation:</u> The Working Group discuss the need and possible means to reduce the harvest of chum salmon in the subsistence fishery.</p> <p><u>Working Group recommendation:</u> Collect public input through personal contacts and a radio call-in show before recommending any actions effecting the subsistence fishery.</p> <p><u>Actual outcome:</u> The Working Group met again on 14 July.</p>
14 July	<p>The Working Group voted to join a Cooperative Appeal for Conservation of Kuskokwim River Chum Salmon. The appeal was issued in conjunction with ADF&amp;G, Association of Village Council Presidents, Kuskokwim Native Association, McGrath Native Village Council, Orutsararmuit Native Council, and Tanana Chiefs Conference. The appeal requested that subsistence users take whatever means possible to conserve chum salmon.</p>
26 July	<p>Chum salmon escapement levels are critically low and it is important to continue conserving chum salmon.</p> <p><u>Dept. recommendation:</u> Working Group meet on 28 July to reevaluate the salmon runs.</p> <p><u>Working Group recommendation:</u> None - the Working Group failed to achieve a quorum.</p> <p><u>Actual outcome:</u> The Working Group met again on 28 July.</p>
28 July	<p>The Working Group approved Donald Evon, of Kwethluk, to serve as alternate to the Lower Kuskokwim Subsistence representative.</p> <p><u>Dept. recommendation:</u> Six hour period in District W-1, below Bethel, on 31 July.</p> <p><u>Working Group recommendation (#1):</u> Six hour period in District W-1 (entire district) on 31 July - Motion failed due to lack of consensus.</p> <p><u>Working Group recommendation (#2):</u> Six hour period in District W-1, below Bethel on 31 July - Motion failed due to lack of consensus.</p> <p><u>Working Group recommendation (#3):</u> Working Group to meet again on 31 July - Motion failed due to lack of consensus.</p> <p><u>Working Group recommendation (#4):</u> Four hour period in District W-1, below Bethel on 31 July - Motion failed due to lack of consensus.</p> <p><u>Working Group recommendation (#5):</u> Working Group to meet again on 30 July.</p> <p><u>Actual outcome:</u> Working Group met again on 30 July.</p>
30 July	<p><u>Dept. recommendation:</u> Six hour period in District W-1, below Bethel on 31 July.</p> <p><u>Working Group recommendation:</u> Six hour period in Districts W-1, below Bethel on 31 July.</p> <p><u>Actual outcome:</u> Six hour period in Districts W-1, below Bethel on 31 July.</p>

- continued -

Table 14. (page 3 of 4)

Date	Comment
1 August	<p>Coho salmon run strength is too weak to allow commercial fishing at this time.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 4 August.</p> <p><u>Working Group recommendation:</u> Working Group to meet again on 4 August.</p> <p><u>Actual outcome:</u> Working Group met again on 4 August.</p>
4 August	<p><u>Dept. recommendation:</u> Six hour period in District W-1, below Bethel on 5 August.</p> <p><u>Working Group recommendation (#1):</u> Six hour period in District W-1 (entire) on 5 August - Motion failed due to lack of consensus.</p> <p><u>Working Group recommendation (#2):</u> Six hour period in District W-1 (entire) on 6 August.</p> <p><u>Actual outcome:</u> Six hour period in District W-1 (entire) on 6 August.</p>
7 August	<p>Coho salmon run strength is too weak to allow commercial fishing at this time.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 9 August.</p> <p><u>Working Group recommendation:</u> None - the Working Group fail to achieve a quorum.</p> <p><u>Actual outcome:</u> Working Group met again on 9 August.</p>
9 August	<p>Coho salmon run strength continues to be too weak to allow commercial fishing.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 11 August.</p> <p><u>Working Group recommendation (#1):</u> Six hour period in Districts W-1 and W-2 on 11 August - Motion failed due to lack of consensus.</p> <p><u>Working Group recommendation (#2):</u> If the coho salmon CPUE in the Bethel test fishery is 50 or greater for the next two tides, six hour period in Districts W-1 and W-2 on 11 August.</p> <p><u>Actual outcome:</u> No commercial period; the Working Group met again on 11 August.</p>
11 August	<p><u>Dept. recommendation:</u> Six hour period in Districts W-1 (time: 1300-1900) and W-2 (time: 1000 - 1600) on 12 August.</p> <p><u>Working Group recommendation:</u> Six hour periods in Districts W-1 and W-2 on 12 August.</p> <p><u>Actual outcome:</u> Six hour periods in Districts W-1 and W-2 on 12 August.</p>
14 August	<p>Coho salmon run strength is too weak to allow commercial fishing more than once per week.</p> <p><u>Dept. recommendation:</u> Working Group meet again on 17 August.</p> <p><u>Working Group recommendation (#1):</u> Six hour periods in Districts W-1 and W-2 on 16 August.</p> <p><u>Working Group recommendation (#2):</u> Working Group meet again on 17 August.</p> <p><u>Actual outcome:</u> Working Group met again on 17 August.</p>

- continued -



Table 14. (page 4 of 4)

Date	Comment
17 August	<u>Dept. recommendation:</u> Six hour period in Districts W-1 (time: 1300-1900) and W-2 (time: 1000 - 1600) on 18 August. <u>Working Group recommendation (#1):</u> Six hour periods in Districts W-1 and W-2 on 18 August - motion failed due to lack of consensus. <u>Working Group recommendation (#2):</u> Working Group reconsidered and accepted their first motion. <u>Actual outcome:</u> Six hour period in Districts W-1 and W-2 on 18 August.
21 August	Coho salmon run strength is too weak to allow commercial fishing at this time. <u>Dept. recommendation:</u> Working Group meet again on 24 August. <u>Working Group recommendation:</u> Working Group meet again on 24 August. <u>Actual outcome:</u> Working Group met again on 24 August.
24 August	Coho salmon run strength continues to be too weak to allow commercial fishing. <u>Dept. recommendation:</u> Working Group meet again on 26 August. <u>Working Group recommendation:</u> Working Group meet again on 26 August. <u>Actual outcome:</u> Working Group met again on 25 August.
26 August	Coho salmon run strength continues to be too weak to allow commercial fishing. <u>Dept. recommendation:</u> Working Group meet again at the call of the Chair if coho run strength improves enough to allow commercial fishing. <u>Working Group recommendation:</u> None - the Working Group failed to achieve a quorum. <u>Actual outcome:</u> Working Group to meet again at the call of the Chair.

Table 15. Commercial salmon harvest and fishing effort by period in Kuskokwim River Districts 1 and 2, and both districts combined, 1997.

Period	Date	Hours	Permits	Chinook		Sockeye		Chum		Pink		Coho	
				Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
<u>District 1</u>													
1	6/23	6	353	10,023	4.73	21,218	10.02	13,090	6.18	0	0.00	0	0.00
2	7/31	6	429	141	0.05	352	0.14	2,060	0.80	2	0.00	14,963	5.81
3	8/06	6	513	145	0.05	229	0.07	1,387	0.45	0	0.00	37,216	12.09
4	8/12	6	507	61	0.02	122	0.04	408	0.13	0	0.00	56,149	18.19
5	8/18	6	475	66	0.02	67	0.02	58	0.02	0	0.00	21,273	7.46
Subtotal		30	604	10,436		21,988		17,003		0		129,601	
<u>District 2</u>													
1	8/12	6	2	1	0.08	0	0.00	23	1.92	0	0.00	494	41.17
2	8/18	6	3	4	0.22	1	0.06	0	0.00	0	0.00	708	39.33
Subtotal		12	4	5		1		23		0		1,202	
Total													
Districts 1 & 2			607	10,441		21,989		17,026		2		130,803	

Table 16. Commercial fishing effort in the Kuskokwim Area by permit-hour<sup>a</sup>, 1960 - 1997.

Year	District 1	District 2	District 3	District 4	District 5	Total
1960	5,136	960	648	4,368	Closed	11,112
1961	16,200	1,512	1,512	4,992	Closed	24,216
1962	14,274		0	8,434	Closed	22,708
1963	5,712	1,722	0	5,520	Closed	12,954
1964	6,468	1,140	0		Closed	7,608
1965	13,500	546	0	3,696	Closed	17,742
1966	18,270		Closed		Closed	18,270
1967	88,248	1,932		3,954	Closed	94,134
1968	77,466	720		7,986	4,704	90,876
1969	67,140	1,488		29,952	14,055	112,635
1970	56,646	3,414		22,080	9,756	91,896
1971	18,060	1,842				19,902
1972	47,802					47,802
1973	77,478	3,072		18,372	2,928	101,850
1974	124,569	4,950		18,984	8,148	156,651
1975	181,786	3,648		12,312	5,400	203,146
1976	82,788	3,894		14,784	4,848	106,314
1977	73,944	3,426		17,592	3,780	98,742
1978	71,856	1,892		14,952	3,672	92,372
1979	49,608	984		27,096	8,220	85,908
1980	33,370	714		21,636	9,504	65,224
1981	45,096	1,248		25,656	11,256	83,256
1982	46,108	1,128		22,656	14,556	84,448
1983	47,040	708		20,748	9,456	77,952
1984	62,643	1,050		31,488	14,004	109,185
1985	37,452	462		22,254	8,544	68,712
1986	48,744	606		25,740	10,572	85,662
1987	60,525	576		21,222	10,332	92,655
1988	81,724	912		27,440	14,064	124,140
1989	66,470	816		26,134	12,552	105,972
1990	50,642	1,051		44,520	10,548	106,761
1991	62,672	1,320		29,160	11,532	104,684
1992	54,288	1,164		35,380	15,180	106,012
1993	39,210	774		35,988	13,118	89,090
1994	54,750	702		26,580	15,768	97,800
1995	42,784	602		34,020	14,844	92,250
1996	37,015	242		18,880	6,518	62,655
1997	13,662	30		28,836	5,820	48,348
10-Year Average (1987-1996)	55,008	816		29,932	12,446	98,202

<sup>a</sup> The number of permits that made deliveries times the number of hours in the period.

Table 17. District 4 commercial salmon harvest and effort by period, 1997.

Period	Date	Hours	Permits	Chinook		Sockeye		Chum		Pink		Coho	
				Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
1	6/13	12	115	6,669	4.83	216	0.16	72	0.05				
2	6/16	12	95	6,358	5.58	411	0.36	279	0.24				
3	6/19	12	123	6,405	4.34	1,678	1.14	788	0.53				
4	6/23	12	67	3,338	4.15	1,623	2.02	1,129	1.40				
5	6/26	12	132	3,578	2.26	2,777	1.75	1,199	0.76				
6	6/30	12	160	2,541	1.32	9,771	5.09	2,498	1.30				
7	7/02	12	178	1,955	0.92	10,007	4.68	2,935	1.37				
8	7/04	12	161	1,381	0.71	8,757	4.53	2,839	1.47				
9	7/07	12	124	1,042	0.70	6,771	4.55	3,552	2.39				
10	7/09	12	153	722	0.39	6,806	3.71	4,638	2.53				
11	7/11	12	102	331	0.27	6,236	5.09	3,997	3.27				
12	7/14	12	4	26	0.54	279	5.81	134	2.79				
13	7/16	12	75	196	0.22	3,315	3.68	2,546	2.83				
14	7/18	12	76	190	0.21	3,005	3.29	2,590	2.84	2	0.00	2	0.00
15	7/21	12	65	197	0.25	2,452	3.14	2,503	3.21	3	0.00	7	0.01
16	7/23	12	56	106	0.16	1,370	2.04	2,210	3.29			36	0.05
17	7/25	12	53	78	0.12	974	1.53	1,281	2.01			62	0.10
18	7/28	12	47	45	0.08	645	1.14	714	1.27			71	0.13
19	7/30	12	46	78	0.14	483	0.88	718	1.30			335	0.61
20	8/01	12	14	28	0.17	331	1.97	359	2.14			389	2.32
21	8/04	12	58	59	0.08	442	0.64	652	0.94			1,946	2.80
22	8/06	12	54	58	0.09	321	0.50	381	0.59			1,589	2.45
23	8/08	12	53	23	0.04	176	0.28	134	0.21			1,602	2.52
24	8/13	12	62	31	0.04	205	0.28	100	0.13			4,382	5.89
25	8/15	12	70	27	0.03	166	0.20	106	0.13			5,095	6.07
26	8/18	12	56	13	0.02	66	0.10	28	0.04			6,931	10.31
27	8/20	12	61	10	0.01	97	0.13	26	0.04			5,551	7.58
28	8/22	12	62	11	0.01	75	0.10	12	0.02			2,493	3.35
29	8/25	12	47	9	0.02	50	0.09	13	0.02			1,036	1.84
30	8/28	12	35	5	0.01	57	0.14	12	0.03			1,335	3.18
31	9/03	12	0	<i>No Buyer</i>									
Total		372	289	35,510		69,562		38,445		5		32,862	

Table 18. Kanektok River peak aerial surveys by species, 1962-1997<sup>a</sup>.

Year	Chinook	Sockeye	Chum	Coho
1962	935	43,108		
1963				
1964				
1965				
1966	3,718		28,800	
1967				
1968	4,170	8,000	14,000	
1969				
1970	4,112	3,028	80,100	
1971				
1972				
1973	814			
1974				
1975		6,018		
1976		2,936	8,697	
1977	5,787	6,304	32,157	
1978	19,180 <sup>b</sup>	44,215	229,290	
1979				
1980	6,172	113,931	23,950	69,325
1981	15,900 <sup>c</sup>	49,175 <sup>c</sup>	71,840 <sup>c</sup>	
1982	<sup>d</sup>	8,142 <sup>d</sup>	55,940 <sup>d</sup>	
1983	8,890	2,340	9,360	
1984	12,182	30,840	48,360	46,830 <sup>e</sup>
1985	13,465	16,270	14,385	
1986	3,643	14,949	16,790	
1987	4,223	51,753	9,420	20,056
1988	11,140	30,440	20,063	
1989	7,914	14,735	6,270	
1990	2,563	32,082	2,475	
1991	2,100 <sup>d</sup>	43,500 <sup>d</sup>	18,000 <sup>d</sup>	4,330
1992	3,856	14,955	25,675 <sup>f</sup>	
1993	4,670	23,128	1,285	
1994	7,386	30,090	10,000 <sup>g</sup>	
1995	<sup>h</sup>	<sup>h</sup>	16,272	2,250
1996	6,107	30,000	7,040	23,656
1997	7,990 <sup>i</sup>	27,100 <sup>i</sup>	3,270 <sup>i</sup>	5,192 <sup>i</sup>
10-Year				
Average	5,360	28,563	11,650	
<b>BEG</b>	<b>5,000</b>	<b>15,000</b>	<b>30,500</b>	

<sup>a</sup> Peak aerial surveys are those rated fair or good surveys obtained between 20 July and 5 August for chinook and sockeye salmon, 20-31 July for chum salmon, and 20 August and 5 September for coho salmon. Years are footnoted when some or all surveys did not meet these criteria.

<sup>b</sup> Chum salmon count excluded from escapement objective calculation due to exceptional magnitude.

<sup>c</sup> Poor survey for chinook, sockeye, chum salmon.

<sup>d</sup> Late survey for chinook, sockeye salmon (after 5 August).

<sup>e</sup> Poor coho survey.

<sup>f</sup> Some chum may have been sockeye.

<sup>g</sup> Chum count not at peak, estimate made during chinook survey.

<sup>h</sup> Partial survey rated poor.

<sup>i</sup> Chinook, chum, and sockeye numbers from 2 August. Chum count not at peak. Coho survey done on 1 October also not at peak.

Table 19. District 5 commercial salmon harvest and effort by period, 1997.

Period	Date	Hours	Permits	Chinook		Sockeye		Chum		Pink		Coho	
				Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
1	6/27	12	25	359	1.20	1,664	5.55	540	1.80				
2	6/30	12	22	299	1.13	4,290	16.25	997	3.78				
3	7/02	12	26	292	0.94	4,325	13.86	1,284	4.12				
4	7/04	12	22	177	0.67	2,154	8.16	798	3.02				
5	7/07	12	29	145	0.42	2,868	8.24	1,389	3.99				
6	7/09	12	36	128	0.30	2,994	6.93	1,180	2.73				
7	7/11	12	38	162	0.36	3,285	7.20	1,036	2.27				
8	7/14	12	42	125	0.25	2,812	5.58	1,180	2.34				
9	7/16	12	22	74	0.28	1,262	4.78	582	2.20				
10	7/18	12	32	74	0.19	1,673	4.36	824	2.15				
11	7/21	12	30	68	0.19	1,300	3.61	820	2.28			1	0.00
12	7/23	12	23	34	0.12	767	2.78	591	2.14			3	0.01
13	7/25	12	17	23	0.11	411	2.01	206	1.01			0	
14	7/28	12	9	9	0.08	254	2.35	94	0.87			5	0.05
15	8/01	12	12	12	0.08	245	1.70	108	0.75			19	0.13
16	8/04	12	7	8	0.10	142	1.69	41	0.49			35	0.42
17	8/08	12	11	16	0.12	174	1.32	17	0.13			97	0.73
18	8/11	12	10	7	0.06	100	0.83	14	0.12			163	1.36
19	8/15	12	17	7	0.03	210	1.03	13	0.06			735	3.60
20	8/18	12	0	<i>No Buyer</i>									
21	8/20	12	21	11	0.04	214	0.85	4	0.02			828	3.29
22	8/22	12	18	6	0.03	155	0.72	4	0.02			629	2.91
23	8/25	12	17	3	0.01	152	0.75	7	0.03			468	2.29
Total		276	54	2,039		31,451		11,729		0		2,983	

Table 20. Historical estimated salmon run size and commercial exploitation rate for Goodnews River, 1981 - 1997.

Year	Species	Middle Fork		Goodnews			Total Run Size	Exploitation <sup>a</sup> Rate Estimate (% of Run)
		Middle Fork Weir Estimate	Aerial Survey Count as a Percentage of Tower Est.	Goodnews River Escapement Estimate	Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Estimate		
1981	Chinook	3,688	b	7,766 <sup>c</sup>	1,409	7,190	20,053	43%
	Sockeye	49,108	b	100,029 <sup>c</sup>	3,511 <sup>d</sup>	40,273	192,921	23%
	Chum	21,827	b	53,799 <sup>c</sup>		13,642	89,268	15%
1982	Chinook	1,395	b	2,937 <sup>c</sup>	1,236	9,476	15,044	71%
	Sockeye	56,255	b	114,587 <sup>c</sup>	2,754 <sup>d</sup>	38,877	212,473	20%
	Chum	6,767	b	16,679 <sup>c</sup>		13,829	37,275	37%
1983	Chinook	6,022	36%	14,398	1,066	14,117	35,603	43%
	Sockeye	25,813	22%	69,955	1,518 <sup>d</sup>	11,716	109,002	12%
	Chum	15,548	b	38,323 <sup>c</sup>		6,766	60,637	11%
1984	Chinook	3,260	35%	8,743	629	8,612	21,244	43%
	Sockeye	32,053	27%	67,213	964	15,474	115,740	14%
	Chum	19,003	35%	117,739	189	14,340	151,271	10%
1985	Chinook	2,831	70%	7,979	426	5,793	17,029	37%
	Sockeye	24,131	11%	50,481	704	6,698	82,014	9%
	Chum	10,367	32%	25,025	348	4,784	40,524	13%
1986	Chinook	2,092	57%	4,094	555	2,723	9,464	35%
	Sockeye	51,069	28%	93,228	942	25,112	170,351	15%
	Chum	14,764	38%	51,910	191	10,355	77,220	14%
1987	Chinook	2,272	100%	4,490	816	3,357	10,935	38%
	Sockeye	28,871	85%	51,989	955	27,758	109,573	26%
	Chum	17,517	58%	37,802	578	20,381	76,278	27%
1988	Chinook	2,712	39%	5,419	310	4,964	13,405	39%
	Sockeye	15,799	30%	38,319	1065	36,368	91,551	41%
	Chum	20,799	21%	39,501	448	33,059	93,807	36%
1989	Chinook	1,915	67%	2,891	467	2,966	8,239	42%
	Sockeye	21,186	60%	35,476	869	19,299	76,830	26%
	Chum	10,380	28%	15,495	760	13,622	40,257	36%
1990	Chinook	3,636	b	7,656 <sup>c</sup>	682	3,303	15,277	26%
	Sockeye	31,679	b	64,528 <sup>c</sup>	905	35,823	132,935	28%
	Chum	6,410	b	15,799 <sup>c</sup>	342	13,194	35,745	38%
1991 <sup>e</sup>	Chinook	1,952	b	4,521 <sup>c</sup>	682	912	8,067	20%
	Sockeye	47,397	b	96,544 <sup>c</sup>	900	39,838	184,679	22%
	Chum	27,525	b	67,844 <sup>c</sup>	106	15,892	111,367	14%

- continued -

Table 20. (page 2 of 2)

Year	Species	Middle Fork		Goodnews			Total Run Size	Exploitation <sup>a</sup> Rate Estimate (% of Run)
		Middle Fork Weir Estimate	Aerial Survey Count as a Percentage of Weir Est.	Goodnews River Escapement Estimate	Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Estimate		
1992	Chinook	1,903	61%	1,854	252	3,528	7,537	50%
	Sockeye	27,268	21%	52,501	905	39,194	119,868	33%
	Chum	22,023	19%	16,084	662	18,520	57,289	33%
1993	Chinook	2,317	b	4,727 <sup>c</sup>	488	2,117	9,649	27%
	Sockeye	26,244	b	54,325 <sup>c</sup>	572	59,293	140,434	43%
	Chum	14,472	b	38,061 <sup>c</sup>	133	10,657	63,323	17%
1994	Chinook	3,856	b	7,866 <sup>c</sup>	657	2,570	14,949	22%
	Sockeye	55,751	b	115,405 <sup>c</sup>	652	69,490	241,298	29%
	Chum	34,849	b	91,653 <sup>c</sup>	402	28,477	155,381	19%
1995	Chinook	4,836	b	9,865 <sup>c</sup>	552	2,922	18,175	19%
	Sockeye	39,009	b	80,749 <sup>c</sup>	787	37,351	157,896	24%
	Chum	33,699	b	88,628 <sup>c</sup>	329	19,832	142,488	14%
1996	Chinook	2,930	b	5,977 <sup>c</sup>	526	1,375	10,808	18%
	Sockeye	58,264	b	120,606 <sup>c</sup>	763	30,717	210,350	15%
	Chum	40,450	b	106,384 <sup>c</sup>	326	11,093	158,253	7%
1997	Chinook	2,937	51%	7,216		2,039	12,192	17%
	Sockeye	35,530	57%	23,462		31,451	90,443	35%
	Chum	17,296	b	45,488 <sup>c</sup>		11,729	74,513	16%

<sup>a</sup> Commercial and subsistence exploitation<sup>b</sup> Incomplete aerial survey results<sup>c</sup> Average Middle Fork/Goodnews River escapement estimate ratio for 1983-1989 used to estimate Goodnews River escapement in years with no aerial survey data. After 1992, that year is included in the estimate ratio also.<sup>d</sup> Subsistence caught chum salmon is included in subsistence sockeye salmon harvest<sup>e</sup> Goodnews Tower Project changed to weir project in 1991.



Table 21. Preliminary outlook for the 1998 Kuskokwim Area commercial salmon harvest (in thousands of fish).

Species	Management District									Kuskokwim Area Total		
	Districts 1 and 2			District 4			District 5					
Chinook	20	to	40	10	to	20	2	to	3	32	to	63
Sockeye	60	to	90	60	to	80	30	to	50	150	to	210
Coho	500	to	700	50	to	90	10	to	30	560	to	820
Pink <sup>a</sup>	3	to	30	15	to	60	4	to	18	22	to	108
Chum	20	to	400	40	to	60	15	to	30	75	to	490
Total	603	to	1,260	175	to	310	61	to	131	839	to	1,691

<sup>a</sup> Outlook is based on historical catches in even years only.

## **FIGURES**

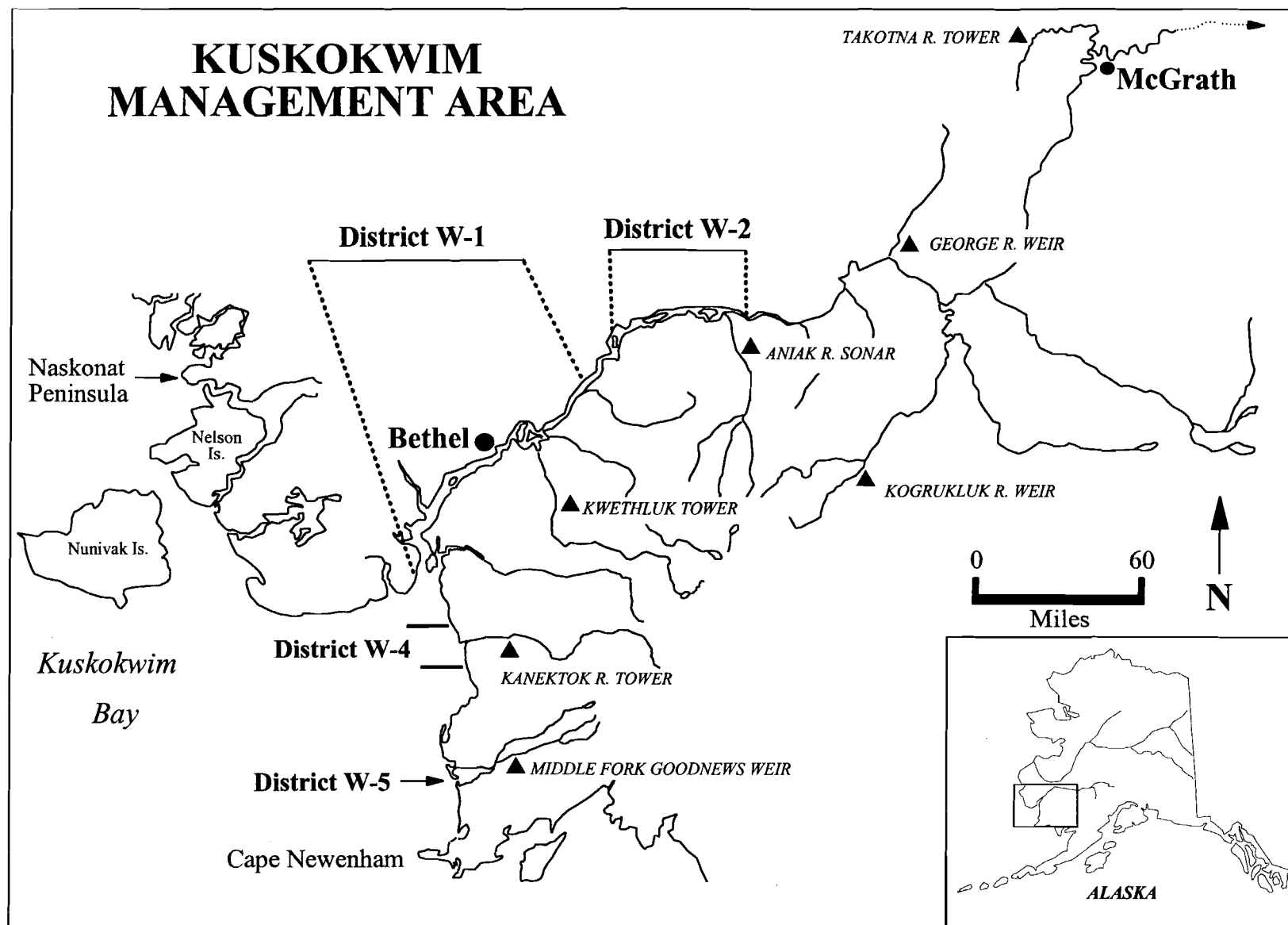


Figure 1. Kuskokwim Area map showing salmon management districts and escapement monitoring projects.

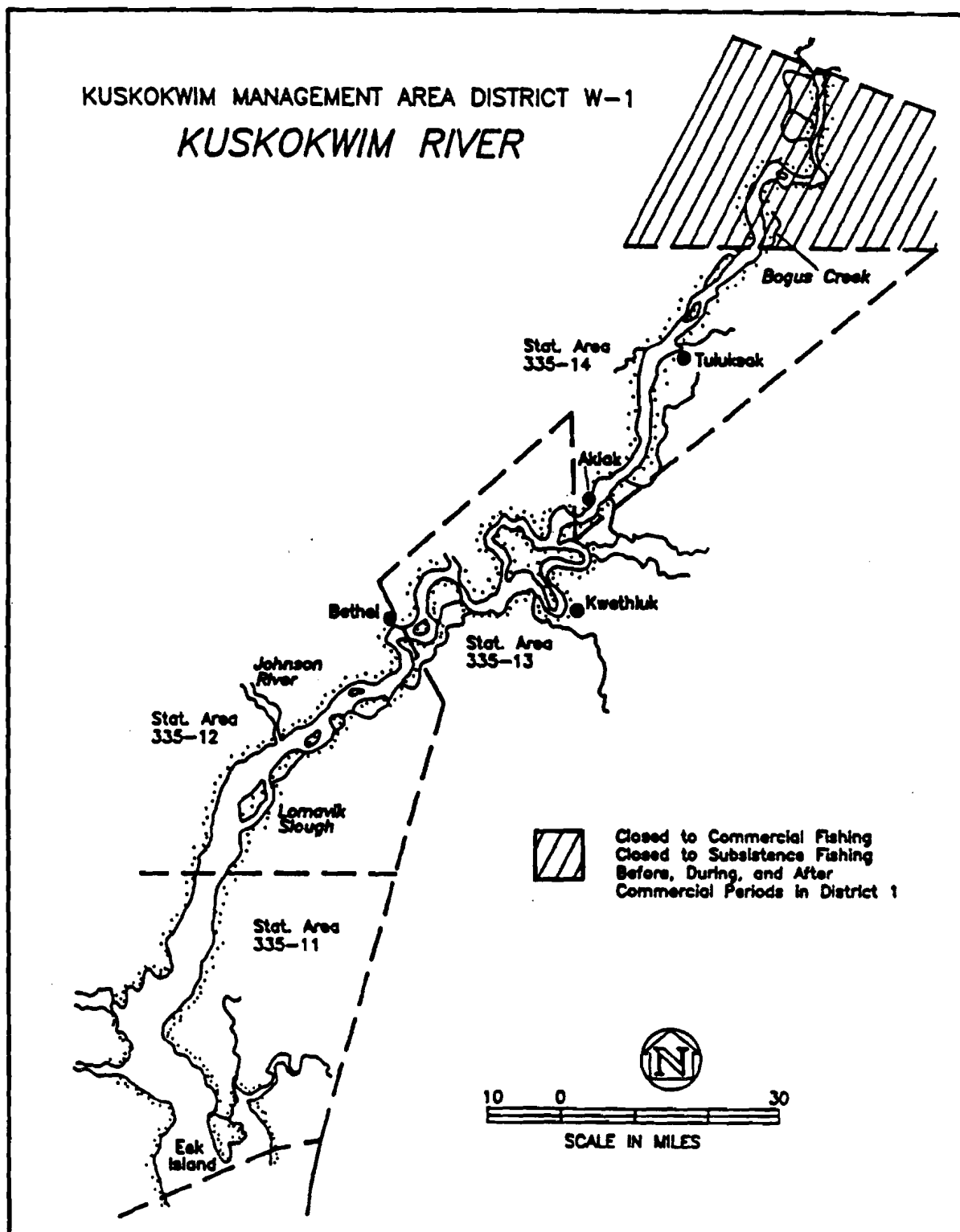


Figure 2. Kuskokwim Management Area, District W-1.

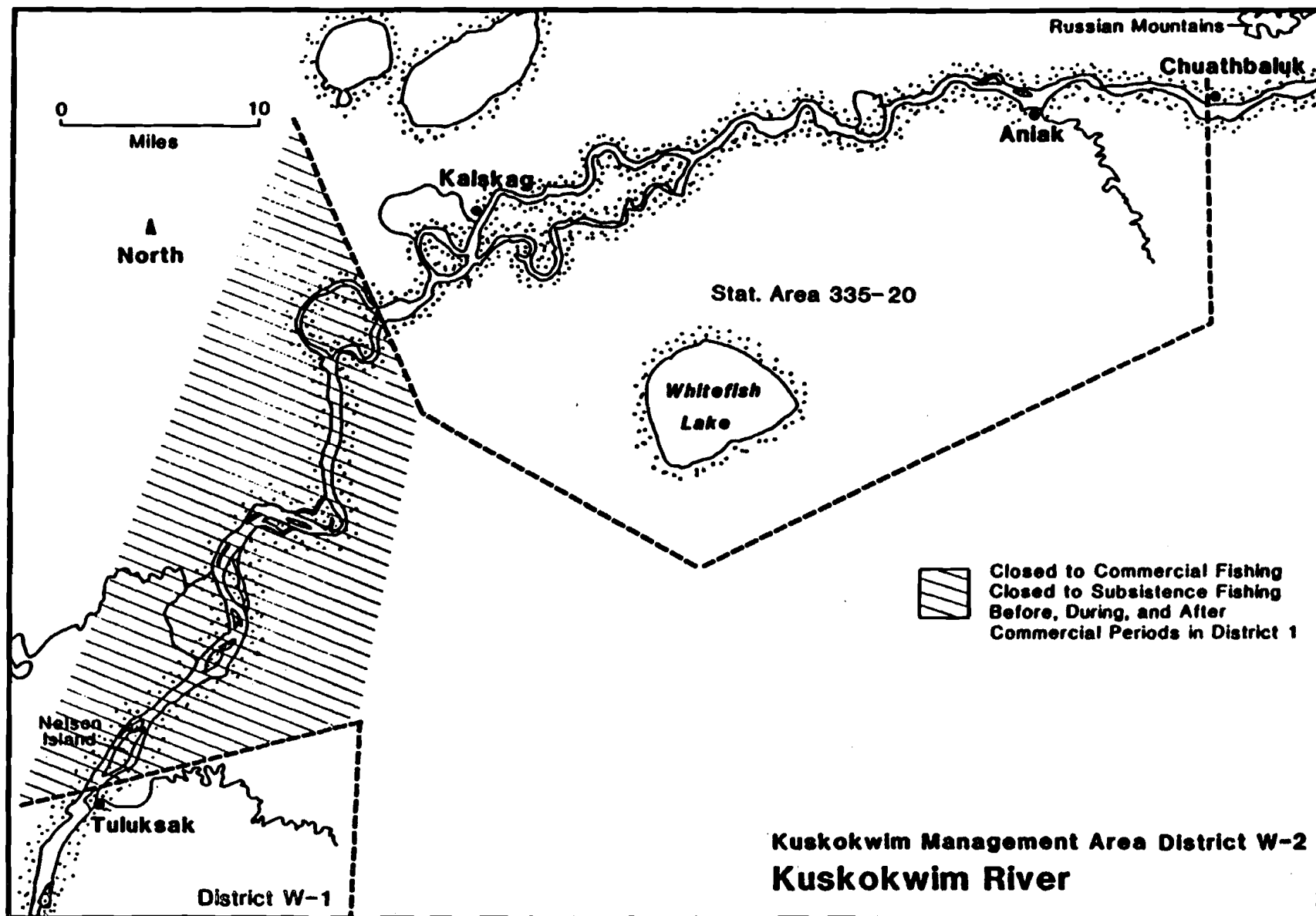


Figure 3. Kuskokwim Management Area, District W-2.

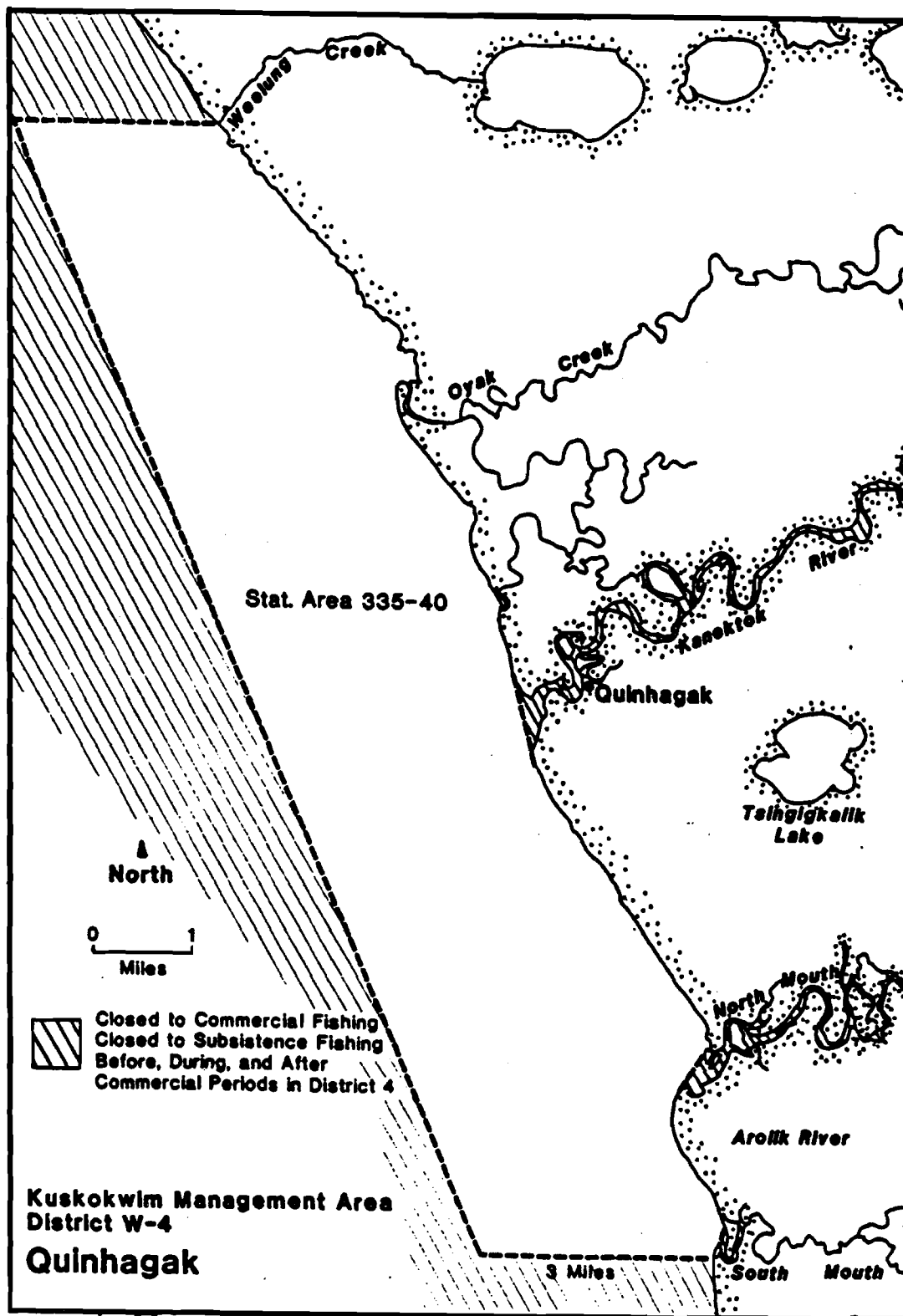


Figure 4. Kuskokwim Management Area, District W-4.

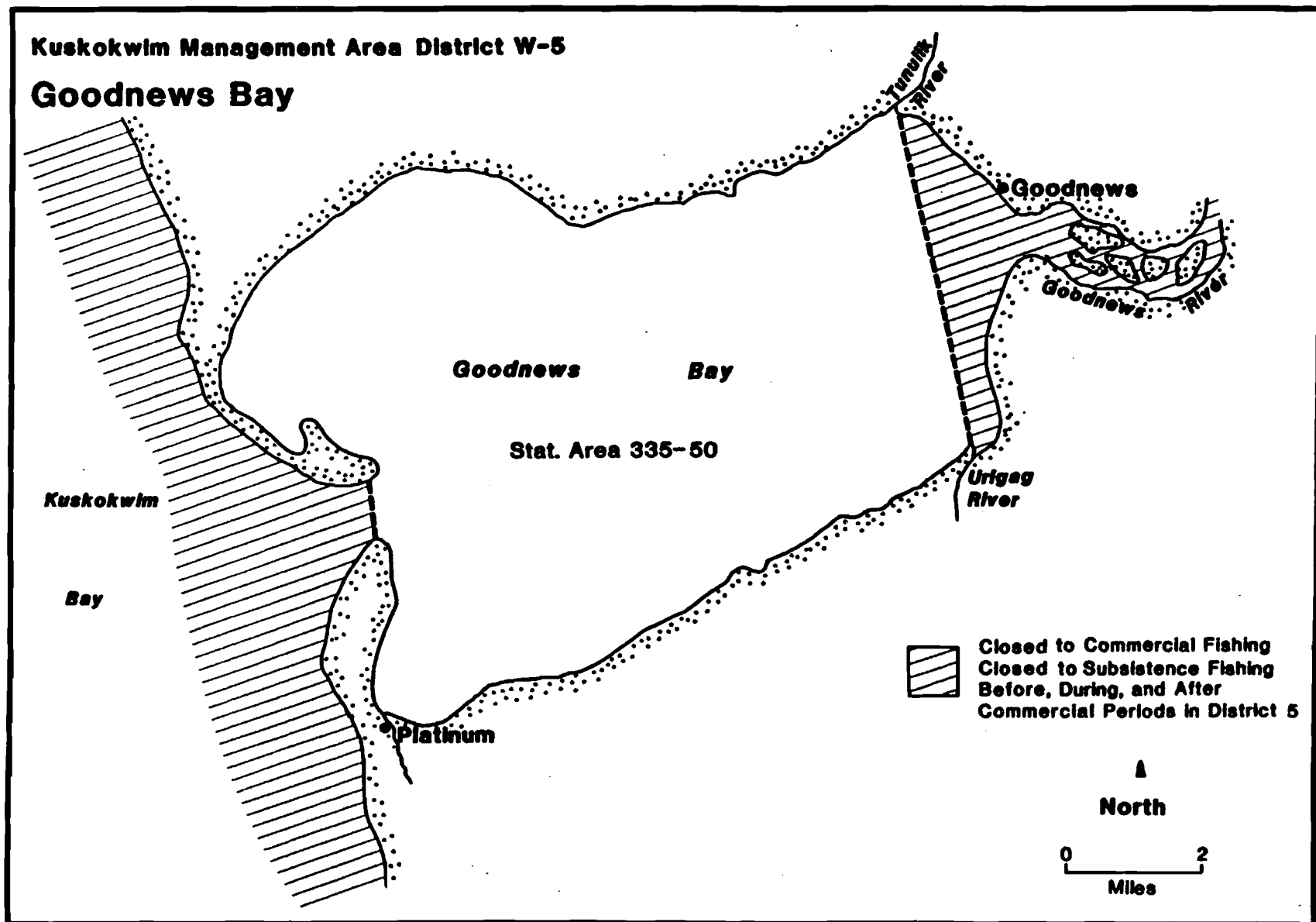


Figure 5. Kuskokwim Management Area, District W-5

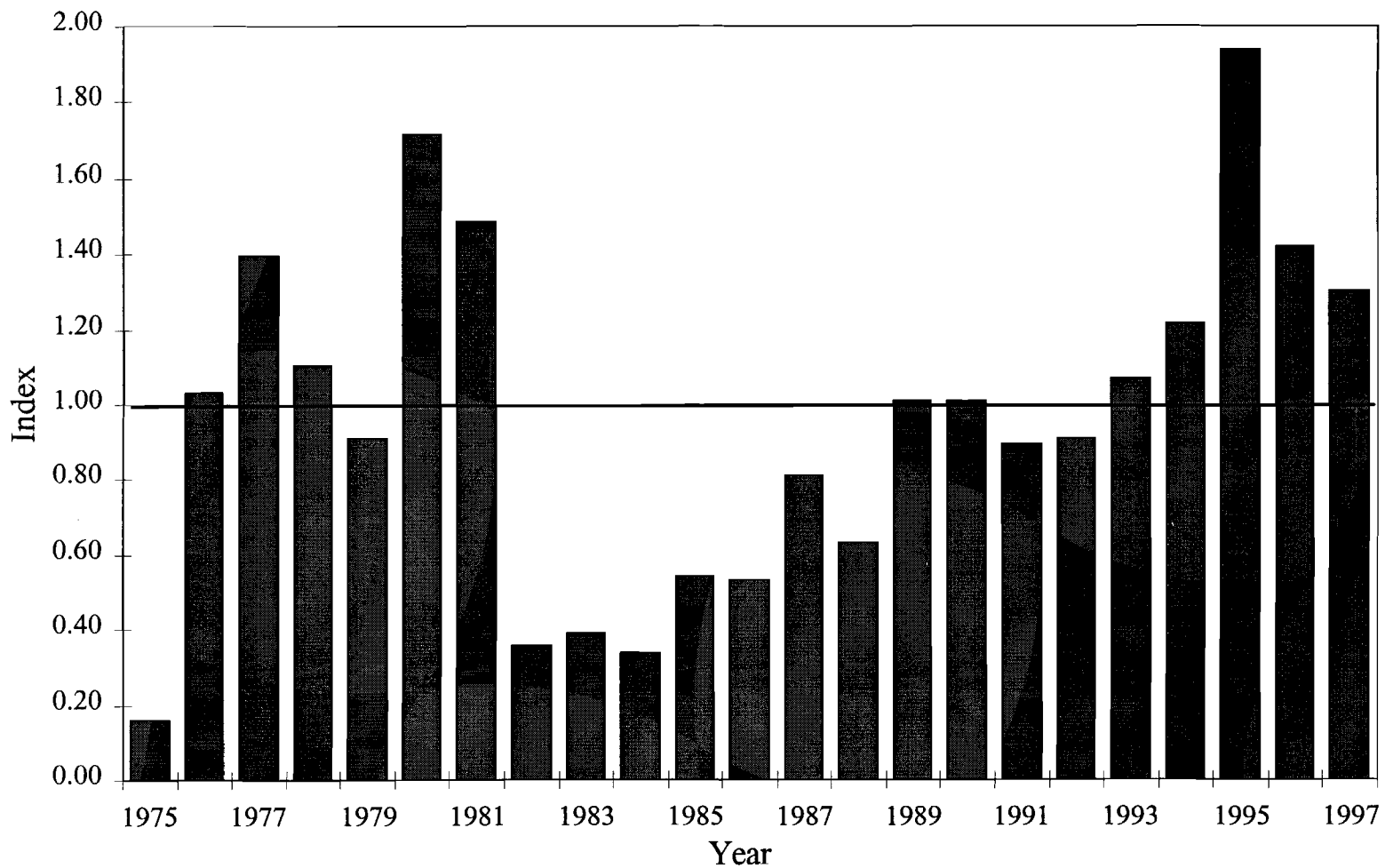


Figure 6. Kuskokwim River chinook salmon escapement index, 1975 - 1997. The index is computed as the median relative escapement of all systems for which data of adequate quality is available. The relative escapement for a system is the proportion of the biological escapement goal (BEG) achieved, if a BEG has been established, and the proportion of the median historical escapement achieved otherwise.



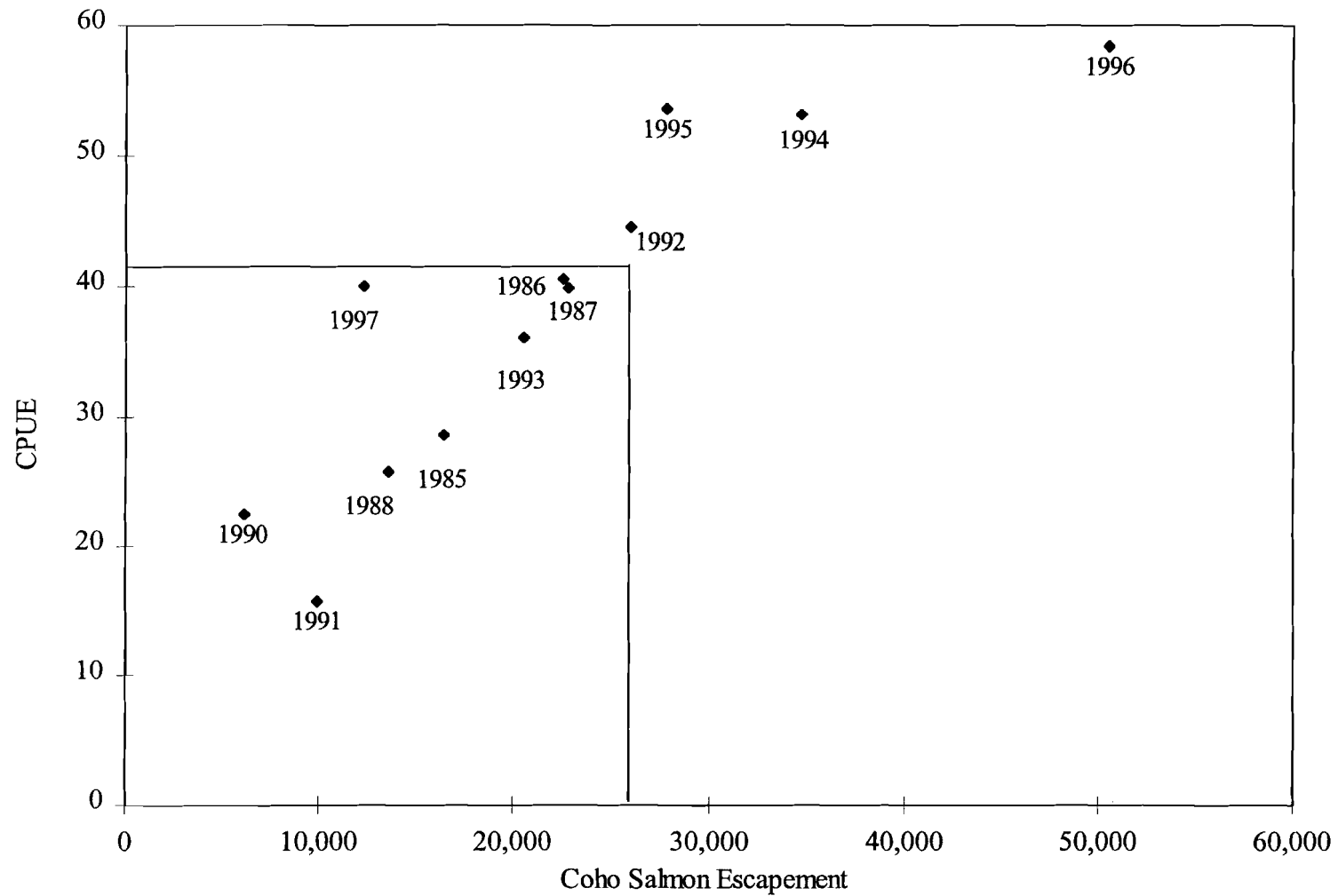


Figure 7. Relationship between annual coho salmon escapement at Kogrukluk River weir and the annual average commercial CPUE between 1 August and 21 August in District W - 2.